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ZOOLOGICAL SERIES

VOL. XVIII, No. 1

DESCRIPTIONS OF FIVE NEW  
INDO-CHINESE BIRDS

BY

OUTRAM BANGS AND JOSSELYN VAN TYNE

WILFRED H. OSGOOD

CURATOR, DEPARTMENT OF ZOOLOGY

EDITOR



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## DESCRIPTIONS OF FIVE NEW INDO-CHINESE BIRDS

BY OUTRAM BANGS AND JOSSELYN VAN TYNE

The five birds here named were secured by the members of the William V. Kelley-Roosevelts Asiatic Expedition of Field Museum of Natural History, Chicago, the Indo-China division of the expedition being under the leadership of Harold J. Coolidge, Jr. The large collection of birds obtained on this expedition is in our hands and we hope soon to publish a detailed account of it in a later number of Field Museum publication.

The present paper is a preliminary one containing only descriptions of some new forms.

### ***Garrulax erythrocephalus hendeei* subsp. nov.**

*Type* from Chapa, Tonkin. No. 68007 Field Museum of Natural History. Adult female. Collected February 15, 1929, by R. W. Hendee. Orig. No. 6.

*Characters*.—Of the eight forms that Stuart Baker (Fauna British India) considers geographical races of *Garrulax erythrocephalus* the new form needs comparison only with *melanostigma* Blyth, from which it differs in having the back slightly grayer, the throat duller reddish brown, and the sides of the neck and the entire chest strongly "scaled"—the feathers of these regions having pale gray edges and dusky centers. Wing of type, 95; tail, 97 mm.

This well-marked form is named for the able young naturalist Russell W. Hendee, whose death of tropical fever was a sad blow to his fellow members of the expedition.

### ***Cursonia crispifrons saxatilis* subsp. nov.**

*Type* from Nam Na River at Bac Tan Trai, Tonkin. No. 68008 Field Museum of Natural History. Adult male. Collected February 26, 1929, by J. Van Tyne. Orig. No. 430.

*Characters*.—Differs from *Cursonia crispifrons crispifrons* (Blyth) of the limestone ranges of Tenasserim in being gray in general coloration instead of olive brown. Upper parts grayish olive brown, the dark edges of the feathers deep black. Lower parts: throat white, heavily striped with deep black, breast and belly dark gray. Wing, 75; tail, 74 mm.

This very gray and black form was found only on the limestone hills whence came the type. Several were shot there by Mr. Coolidge but all but the type were lost in the holes in the rocks into which they fell.

**Schoeniparus rufogularis kelleyi** subsp. nov.

*Type* from Phuoc Mon, Quangtri, Annam. No. 68009 Field Museum of Natural History. Breeding male. Collected January 30, 1929, by J. Van Tyne. Orig. No. 167.

*Characters.*—A very distinct form, differing sharply from *S. r. major*, *S. r. blanchardi*, and *S. r. stevensi* in having the throat band broader and deep chestnut in color very much darker than in any of the other known forms. The head and whole upper parts are much darker than in any of the other races. Wing of type, 66; tail, 50 mm.

Named for Mr. William V. Kelley, who financed the expedition.

**Alcippornis poiocephala alearis** subsp. nov.

*Type* from Muong Moun, Tonkin. No. 68010 Field Museum of Natural History. Adult male. Collected March 29, 1929, by J. Van Tyne. Orig. No. 921.

*Characters.*—Most nearly like *Alcippornis p. magnirostris* (Walden) and as in that form with sooty brown coronal stripes and grayish brown head (thus differing from *Alcippornis p. harringtoniae* Hartert). From *Alcippornis p. magnirostris* the new form differs in its darker, less olive brown back; duller, less cinnamon-rufous rump and outer edges of wing feathers; and in its more cinnamon-rufous under parts. Wing of type, 67; tail, 60 mm.

**Phylloscopus pernotus** sp. nov.

*Type* from Muong Yo, Laos. No. 68011 Field Museum of Natural History. Adult female. Collected May 19, 1929, by J. Van Tyne. Orig. No. 1734.

*Characters.*—Somewhat similar to *Phylloscopus trivirgatus ricketti* (Slater) but smaller, and breast and belly white instead of yellow.

Upper parts rather duller olive green than in *Phylloscopus t. ricketti* and dark head stripes duller—olivaceous dusky instead of black. Lower parts very different; throat and under tail coverts yellow, breast and belly white, becoming grayish on sides. Wing, 50; tail, 35.5 mm. (the wing in a long series of *Phylloscopus t. ricketti* measures 53 to 56 mm.).

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BATS FROM POLYNESIA, MELANESIA,  
AND MALAYSIA

BY

COLIN CAMPBELL SANBORN

ASSISTANT CURATOR OF MAMMALS

--

WILFRED H. OSGOOD

CURATOR, DEPARTMENT OF ZOOLOGY

EDITOR



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# BATS FROM POLYNESIA, MELANESIA AND MALAYSIA

BY COLIN CAMPBELL SANBORN

The following report is based upon the collections of bats made by the Crane Pacific Expedition of Field Museum of Natural History, by the Whitney South Sea Expedition of the American Museum of Natural History, and by Dr. William Mann for the Museum of Comparative Zoology. Included also are two specimens presented by John T. Zimmer.

The combined collections contain 783 specimens, representing nineteen genera and fifty-three species and subspecies. Of these, nine genera and thirty-seven species belong to the Megachiroptera and ten genera and sixteen species to the Microchiroptera.

The greatest value of this material is, perhaps, what it has added to knowledge of distribution, for there are specimens from many islands never collected on before and new records from various other islands. Distribution, and especially seasonal distribution, is undoubtedly governed by the food supply. Of seasonal distribution very little is known. That distribution is, in some cases, probably very limited is shown by the material from the Solomon Islands where twenty-one forms were taken. The Whitney South Sea Expedition has collected bats in the Solomons in every month except May, and from seventeen islands visited secured fourteen forms, ten of which are in its collection only. The Crane Pacific Expedition visited three islands in April, securing five forms of which four are not in the other collections. Dr. Mann collected six species on three islands and three of these were taken only by him. Kulambangra was the only island visited by but one of the expeditions, and no two collectors visited any island during the same month. If there was a wider distribution of the various forms there should have been more than four species duplicated by two of the expeditions.

There is still much to be learned about the Megachiroptera besides distribution. Many species are known only from a type or from a few specimens. In some species there appears to be a wide range in color, and series of certain forms are needed to fully establish their status. A systematic survey of the Pacific islands would go far toward a better understanding of this group.



In the nine years since the publication of Mr. Knud Andersen's *Catalogue of the Chiroptera*, twenty-five new forms of fruit-bats have been described. A list of these is given at the end of this report. Two new species are described in this paper.

The Crane Pacific Expedition was in the field from January to August, 1929. Most of the 587 bats taken were collected by Frank C. Wonder, the mammalogist of the expedition. These were secured on twelve of the islands visited by the expedition between the Fiji Islands and the Philippines. Some species are represented by large series. Eighteen of the forms taken are not represented in the other collections and three are described as new.<sup>1</sup>

The Whitney South Sea Expedition has been in the field for many years but primarily in search of birds. Its collection of 211 bats is the richest in forms and is from the widest territory. I have examined specimens taken between 1923 and 1930, collected by Rollo H. Beck, F. P. Drowne, Hannibal Hamlin, and others. This collection contains nineteen forms not represented in the other collections and two have been described as new.

The collection of Dr. William Mann from the Solomon Islands is small, containing but six species. Three of these, however, are not represented in the other collections although they are from islands visited by the other expeditions. I have examined twelve specimens from this collection, which was identified by Dr. G. M. Allen.

I am indebted to the authorities of the American Museum of Natural History for the privilege of examining their material and for permission to include it in this report. My thanks are also due to H. E. Anthony, Curator of Mammals, and to the members of the department of mammals for their interest and cooperation. I wish to thank Dr. Glover M. Allen of the Museum of Comparative Zoology for the same favors in connection with Dr. Mann's collection. John T. Zimmer generously presented two specimens from New Guinea and the United States National Museum loaned one for comparison with them.

The spelling used for the names of the various islands has been taken, wherever possible, from *An Index to the Islands of the Pacific*, by William T. Brigham (Mem. B. P. Bishop Mus. Ethnol. and Nat. Hist., 1, Mem. 2, Dec. 1900).

<sup>1</sup>Besides the bats covered in this report, the Crane Pacific Expedition secured specimens of *Artibeus j. jamaicensis* and *Macrotus w. waterhousei* in Haiti, and *Myotis n. nigricans* and *Saccopteryx b. bilineata* in Panama.

## LIST OF LOCALITIES AND SPECIES

## TONGA ISLANDS

Uanukuilialhaki Island . . . . . *Pteropus tonganus*

## SAMOAN ISLANDS

Olosenga Island . . . . . *Pteropus tonganus*  
*Pteropus samoensis*  
 Tutuila Island . . . . . *Pteropus samoensis*  
 Savii Island . . . . . *Pteropus samoensis*  
 Upolu Island . . . . . *Pteropus samoensis*  
 Manua Group . . . . . *Pteropus tonganus*  
 Tau Island . . . . . *Emballonura semicaudata*

## FIJI ISLANDS

Namena Island . . . . . *Pteropus tonganus*  
 Nairai Island . . . . . *Pteropus tonganus*  
 Yasawa Island . . . . . *Pteropus tonganus*  
 Vana Levu Island . . . . . *Pteropus tonganus*  
 Ovalau Island . . . . . *Pteropus tonganus*  
 Viti Levu Island . . . . . *Pteropus tonganus*  
*Notopteris macdonaldi*  
*Emballonura semicaudata*  
 Taviuni Island . . . . . *Pteropus nawaiensis*

## NEW HEBRIDES ISLANDS

Aurora Island . . . . . *Pteropus eotinus*  
 Lopevi Island . . . . . *Pteropus eotinus*  
 Mau Island . . . . . *Pteropus bakeri*  
 Nguna Island . . . . . *Pteropus bakeri*  
 Malo Island . . . . . *Miniopterus australis*  
*Hipposideros cervinus*  
 Malekula Island . . . . . *Pteropus geddiei*  
*Pteropus eotinus*  
 Elephant Island . . . . . *Pteropus geddiei*  
 Espiritu Santo Island . . . . . *Pteropus geddiei*  
*Pteropus eotinus*  
*Hipposideros cervinus*  
 Efate Island . . . . . *Pteropus geddiei*  
*Pteropus bakeri*  
*Hipposideros cervinus*  
 Penticost Island . . . . . *Pteropus geddiei*

## BANKS ISLANDS

Ureparapara Island . . . . . *Pteropus banksiana*

## SANTA CRUZ ISLANDS

Vanikoro Island . . . . . *Pteropus geddiei*  
*Pteropus tuberculatus*  
 Tapoua Island . . . . . *Pteropus geddiei*  
 Santa Cruz Island . . . . . *Pteropus geddiei*  
*Pteropus nilendensis*  
*Hipposideros tricuspidatus*  
 Fenualoa Island . . . . . *Hipposideros cervinus*

## DUFF GROUP

Masurers Island . . . . . *Pteropus geddiei*

## MATEMA (SWALLOW) ISLANDS

Nupani Island . . . . . *Pteropus geddiei*

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## SOLOMON ISLANDS

Ronongo Island	<i>Pteropus solomonis</i> <i>Pteropus lavellanus</i>
Tucopia Island	<i>Pteropus geddi</i>
Rennell Island	<i>Pteropus geddi</i>
Mono Island	<i>Pteropus colonus</i> <i>Pteropus grandis</i>
Kulambangra Island	<i>Pteropus woodfordi</i>
Savo Island	<i>Emballonura n. solomonis</i>
Bauro Island	<i>Emballonura n. solomonis</i>
Guadalcanar Island	<i>Pteropus rayneri</i>
Pavuvu (Russell) Island	<i>Nesonycteris woodfordi</i> <i>Emballonura n. solomonis</i>
Vella Lavella Island	<i>Pteropus solomonis</i> <i>Pteropus lavellanus</i> <i>Emballonura n. solomonis</i> <i>Hipposideros d. oceanitis</i>
Ghizo Island	<i>Pteropus lavellanus</i>
Malaita Island	<i>Pteropus rayneri</i>
Ysabel Island	<i>Roussettus brachyotis</i> <i>Pteropus mahaganus</i> sp. nov. <i>Pteropus grandis</i> <i>Pteralopex atrata</i> <i>Emballonura cor</i> <i>Hipposideros d. oceanitis</i>
Choiseul Island	<i>Pteropus grandis</i> <i>Nyctimene scitulus</i> <i>Anthops ornatus</i>
Malapa Island	<i>Nyctimene scitulus</i>
Narovo Island	<i>Pteropus solomonis</i> <i>Pteropus rubianus</i>
San Christoval Island	<i>Pteropus cognatus</i> <i>Dobsonia nesea</i> <i>Macroglossus l. microtus</i> <i>Emballonura n. solomonis</i>
Ugi Island	<i>Pteropus cognatus</i> <i>Hipposideros tricuspidatus</i>
Bougainville Island	<i>Pteropus grandis</i> <i>Hipposideros d. oceanitis</i>

## LOUISIADE ARCHIPELAGO

Moratau Island	<i>Pteropus h. luteus</i>
Tagula Island	<i>Pteropus h. luteus</i>
Goodenough Island	<i>Nyctimene geminus</i>

## BISMARCK ARCHIPELAGO

New Britain	<i>Dobsonia praedatrix</i>
New Ireland	<i>Dobsonia praedatrix</i>

## TERRITORY OF NEW GUINEA

Marienberg, Sepik River	<i>Pteropus h. vulcanius</i> <i>Pteropus sepiensis</i> sp. nov. <i>Pteropus papuanus</i> <i>Pteropus epularis</i> <i>Dobsonia m. magna</i> <i>Hipposideros cervinus</i> <i>Miniopterus schreibersii magnator</i> subsp. nov.
Koragu	<i>Leuconoe moluccarum</i>
Nyomonga	<i>Pipistrellus papuanus</i> <i>Leuconoe moluccarum</i>

Nissan Island .....	<i>Leuconoe moluccarum</i> <i>Emballonura n. solomonis</i> <i>Hipposideros calcaratus</i>
BRITISH NEW GUINEA	
Wareo .....	<i>Pipistrellus papuanus</i>
Port Moresby .....	<i>Scoteinus greyii</i>
BRITISH NORTH BORNEO	
Sandakan .....	<i>Rhinolophus sedulus</i> <i>Myotis muricola</i>
PHILIPPINE ISLANDS	
Mindanao Island .....	<i>Pteropus v. lunensis</i> <i>Pteropus mearnsi</i> <i>Acerodon j. mindanensis</i> <i>Macroglossus l. lagochilus</i> <i>Kerivoula hardwicki</i>

### ANNOTATED LIST<sup>1</sup>

#### **Roussettus brachyotis** Dobson.

*Cynopterus brachyotis* Dobson, P. Z. S. Lond., p. 116, 1877.

*Roussettus brachyotis* Trouessart, Cat. Mamm., Suppl., p. 60 (pt.), 1904.

SOLOMON ISLANDS: Ysabel (M. C. Z. No. 17208-11), twelve (alc.) (four examined), 1916.

This species has been recorded from Fauro and Guadalcanar in the Solomons but this is the first instance of its occurrence on Ysabel. The forearms are 74 and 76 mm. in two males and 68.2 in a female. P<sup>1</sup> is present on both sides in all the skulls. Andersen found that the formula for the palatal ridges in the one specimen examined was 3+4+1 but added that "some slight individual variation may occur." In the larger male the fourth ridge is divided in the median line making the formula the same. In the other male and in the female the formula is 4+3+1. Andersen found the same variation in *R. leachi*.

#### **Pteropus hypomelanus luteus** K. Andersen.

*Pteropus hypomelanus luteus* K. Andersen, Ann. and Mag. Nat. Hist., (8), 2, p. 362, 1908.

LOUISIADÉ ARCHIPELAGO: Moratau Island (A. M. No. 79804), male, Nov. 14, 1928; Tagula Island (A. M. No. 79833-34), male, female (skins only), Feb. 15, 19, 1929.

This species has not hitherto been reported from these islands, but is known from Conflict Island, Woodlark Island, and New Guinea.

<sup>1</sup>Reference is to skin with skull unless otherwise stated. A. M.=American Museum of Natural History, F. M.=Field Museum of Natural History, M. C. Z.=Museum of Comparative Zoology.

***Pteropus hypomelanus vulcanius* Thomas.**

*Pteropus hypomelanus vulcanius* Thomas, Ann. and Mag. Nat. Hist., (8), 15, p. 388, 1915.

TERRITORY OF NEW GUINEA: Marienberg, forty miles up the Sepik River (F. M. No. 31858), juv. male, May 17, 1929.

This specimen was compared with the types of *Pt. h. luteus* and *Pt. h. vulcanius* by Dr. W. H. Osgood, who found that it differed in many respects from both of them. It is, however, very immature.

While this specimen does not have the buffy or dull whitish wash on the chest and belly, nor the intermixture of the light buffy or whitish hairs on the back, as in *vulcanius*, this is no doubt due to its immaturity. Its main difference is in its black throat, which in *vulcanius* is dull buffy. Dr. Osgood also found that the teeth appeared to be wider in proportion to their length than the teeth of either *luteus* or *vulcanius*.

With but one immature specimen, however, these two differences hardly warrant the naming of another subspecies in a group already so full, and especially as Vulcan Island is only about fifty miles in an air line from Marienberg.

***Pteropus mearnsi* Hollister.**

*Pteropus mearnsi* Hollister, Proc. Biol. Soc. Wash., 26, p. 112, 1913.

PHILIPPINE ISLANDS: Zamboanga, Mindanao (F. M. No. 33708-9), two males (one alc.), July 20, 23, 1929.

The skin, while mainly agreeing with the description of the type, is smaller and lacks the golden ochraceous in the center of the belly.

***Pteropus solomonis* Thomas.**

*Pteropus solomonis* Thomas, Nov. Zool., 11, p. 597, 1904.

SOLOMON ISLANDS: Ronongo Island (A. M. No. 79853), female, Oct. 22, 1927; Vella Lavella Island (A. M. No. 79950), male, Nov. 11, 1927; Narovo Island (A. M. No. 79855), female, Oct. 26, 1927.

This species was formerly known from the type specimen only, which was collected on Ghizo Island in November. The forearm of the type measured 110 mm. and the forearms of this series measure 107, 108 and 109.6.

***Pteropus colonus* K. Andersen.**

*Pteropus colonus* K. Andersen, Ann. and Mag. Nat. Hist., (8), 2, p. 363, 1908.

SOLOMON ISLANDS: Mono Island (A. M. No. 79851-52, 79856-59, 79866-67), six males, two females, Dec. 7, 1927.

*Pt. colonus* has been known previously from Shortland and Alu Islands from two specimens. The present series of *colonus* and

*solomonis* agree closely with the original descriptions in color and measurements and vary in but one respect. Andersen gives the length of  $m^1$  in *colonus* 4.4–4.5 mm. and 5.2 in *solomonis*; this tooth in this series of *colonus* measures 3.8 (very worn)–4.5 and in *solomonis* 4.3, 4.5, and 4.8.

### ***Pteropus tonganus* Quoy and Gaimard.**

*Pteropus tonganus* Quoy and Gaimard, Voy. Astrolabe, Zool., 1, p. 74, 1830.

TONGA ISLANDS: Uanukuhahaki Island (A. M. No. 73617), male (A. M. No. 77948–49), two females (alc.), Aug. 5, 1924.

SAMOAN ISLANDS: (A. M. No. 68738), male (alc., skull removed), Jan. 1924; Olosenga Island (A. M. No. 68736–37, 68739), two males, one female (alc.), Jan. 24, 1924; Manua Group (A. M. No. 68749), male (alc.), 1924.

FIJI ISLANDS: (A. M. No. 69212–16), one male, four females (alc.), Sept. 24, 1924; Namena Island (A. M. No. 69562), male (skin only), Feb. 2, 1925; Nairai Island (A. M. No. 69563–64), two males, Feb. 16, 1925; Yasawa Island (A. M. No. 69565), female (A. M. No. 69571–73), three females (alc.), Jan. 5, 1925; Vana Levu Island (A. M. No. 73619), skull only, Feb. 3, 1925; Viti Levu Island (F. M. No. 31538–45), two males, six females, March 16, 1929; Ovalau Island (F. M. No. 31546–50), two males, three females, March 19, 1929.

This species and the following probably have the widest distribution of any of the forms of *Pteropus* and, from specimens in collections, are apparently rather abundant.

### ***Pteropus geddiei* MacGillivray.**

*Pteropus geddiei* MacGillivray, Zool., 18, p. 7134, 1860. Type locality Aneiteum Island, New Hebrides.

NEW HEBRIDES: Malekula Island (A. M. No. 79897), juv. (alc.), Oct. 8, 1926; (F. M. No. 31551–52), two females, March 28, 1929; Elephant Island (F. M. No. 31554), male, April 4, 1929; Espiritu Santo Island (F. M. No. 31553, 31555–57), two males, two females (F. M. No. 33700), female (alc.), April 3, 5, 1929, (A. M. No. 75189), male, Dec. 8, 1926; Efate Island (A. M. No. 79951), female, June 28, 1926; Pentecost Island (A. M. No. 79990), head only (alc.), Jan. 1, 1927.

SANTA CRUZ ISLANDS: Vanikoro Island (A. M. No. 79958–60), male, female, Sept. 25, 1926; Tapoua Island (A. M. No. 79952), male (skin only) (A. M. No. 79961), male, Sept. 29, 1926, (A. M. No. 79983–85, 79987, 79989), one male, one female, three juv. (alc.), Aug. 28, 1926; Santa Cruz Island (A. M. No. 75191–94), two males, two females (75193 skin only), Feb. 23, 24, 1927.

MATEMA (SWALLOW) ISLANDS: (A. M. No. 79988), juv. (alc.), Oct. 11, 1926; Nupani Island (A. M. No. 79956–57), male, female, Oct. 15, 1926.

DUFF GROUP: Masurers Island (A. M. No. 75196, 79963), two males, Oct. 5, 1926.

SOLOMON ISLANDS: Tucopia Island (A. M. No. 79195), female, Feb. 12, 1927,  
Rennell Island (A. M. No. 79802), male, Aug. 29, 1928.

SOUTH SEA ISLANDS (A. M. No. 73618, 79964), two skulls only

This series greatly increases the range of *Pt. geddiei* as known by Andersen, and shows *geddiei* to be a wide ranging form of fairly uniform color with a forearm of from 150 to 170 mm. When I first examined this large series I came to the conclusion that *Pt. geddiei* MacGillivray should be a synonym of *Pt. vanikorensis* Quoy and Gaimard. After a conversation with Mr. Ellis Le G. Troughton of the Australian Museum, who has not only made a thorough survey of Vanikoro Island but who has lately examined the type of *vanikorensis* in Paris, I agree with him that *vanikorensis* is really a synonym of *Pt. tonganus* Quoy and Gaimard. The reasons for this conclusion will be given by Mr. Troughton in a future paper.

***Pteropus sepikensis* sp. nov.**

*Type* from Marienberg, forty miles up the Sepik River, Territory of New Guinea. No. 31855 Field Museum of Natural History. Adult male. Collected May 22, 1929, by Frank C. Wonder. Orig. No. 303.

*Diagnosis*.—A member of the *melanopogon* group and about the size of *Pt. melanopogon* but much darker throughout. Size very large, forearm 204 mm.

*Color*.—Top and sides of head, from in front of eyes to in front of ears, belly, flanks, lower breast, and chin covered by very dark brown hairs, some of which have light, almost straw-colored tips, most prominent in center of belly, lower breast, rump, anal region, and sides of head. There are a few silver hairs throughout the dark brown parts. The bases of all the hairs from a line in front of the ears and down the top of the neck to the back, are close to Cream Color. The tips of the hairs of the mantle and the whole length of the crinkly hairs on the sides of the neck are close to Ochraceous Orange. Some of the crinkly hairs are scattered across the throat and mingle with the light-tipped hairs of the lower breast. Back and tibia naked. The under side of the membrane along lower forearm covered with dark brown hairs.

*Skull*.—Long and narrow with a well-developed sagittal crest extending the full length of the braincase. Coronoid heavy and sharply ascending. Teeth long and narrow.

*Measurements*.—Forearm 204; pollex, total length c. u. 76; pollex metacarpal 18.5, first phalanx 44; second digit, metacarpal 111,

first phalanx 22, second and third phalanges c. u. 22; third digit, metacarpal 132, first phalanx 101, second phalanx 153; fourth digit, metacarpal 130, first phalanx 85, second phalanx 83; fifth digit, metacarpal 139, first phalanx 64, second phalanx 58. Ear 24, flat 16; lower leg 93; foot c. u. 61; calcar 29. All measurements from dried skin. Skull: Total length to gnathion 90.9; palation to incisive foramina 45.5; front of orbit to tip of nasals 32; width of brain case at zygomata 29; zygomatic width 49; width across  $m^1$  externally 23.2; lachrymal width 19; width across canines externally 17.9; postorbital constriction 12.2; width of mesopterygoid fossa 9; width between  $p^4$ — $p^4$  internally 14.8; orbital diameter 17.1; mandible length 73; coronoid height 35.8; upper teeth c— $m^3$  35; lower teeth c— $m$ , 40.7.

*Remarks.*—The type, and only known specimen, is very old. The teeth are worn smooth and there are no characters left in them. They are, undoubtedly, very much as in true *melanopogon* which, from Andersen's measurements, is nearly the same size as *sepikensis*. Its very different color will readily distinguish *sepikensis* from the other members of the group which are found in the Amboina group, Bunda Islands, Timor Laut, Key, and Aru Islands, all west of New Guinea, and one species on Johanna Island, Comoros, between Madagascar and the mainland. The type was brought in by a native and other specimens were seen later but were flying so high that they were out of the range of a twelve gauge shotgun. In the skull of the type the zygomatic arch shows that it had been broken in three places but had healed and grown together again.

### ***Pteropus cognatus* K. Andersen.**

*Pteropus cognatus* K. Andersen, Ann. and Mag. Nat. Hist., (8), 2, p. 365, 1908.

SOLOMON ISLANDS: San Christoval Island (A. M. No. 79749), male, Dec. 18, 1929; Ugi Island (M. C. Z. No. 17214), one (alc., skull removed), 1916.

Formerly known from San Christoval Island only.

### ***Pteropus rayneri* Gray.**

*Pteropus rayneri* Gray, Cat. Monk., etc., p. 108, 1870.

SOLOMON ISLANDS: Guadalcanar Island (A. M. No. 79854, 79868), two females, July 22, 25, 1927; Malaita Island (A. M. No. 92149), male, Feb. 6, 1930.

One specimen from Guadalcanar is a juvenal with a forearm of 120 mm. The other is adult but has a very dark, small rump patch for this species. Formerly known from Guadalcanar only.

### ***Pteropus rubianus* K. Andersen.**

*Pteropus rubianus* K. Andersen, Ann. and Mag. Nat. Hist., (8), 2, p. 366, 1908.



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SOLOMON ISLANDS: Narovo Island (A. M. No. 79942), female, Oct. 27, 1927.  
F. A. 166.1 mm.

This specimen is here referred to *Pt. rubianus* on account of its long forearm. It seems intermediate in color between *rubianus* and *lavellanus*. *Pt. rubianus* was described from an alcoholic specimen and the type is still the only one known.

### **Pteropus lavellanus** K. Andersen.

*Pteropus lavellanus* K. Andersen, Ann. and Mag. Nat. Hist., (8), 2, p. 366, 1908.

SOLOMON ISLANDS: Vella Lavella Island (A. M. No. 79948), male, Nov. 14, 1927; Ghizo Island (A. M. No. 79944), male (skin only), Oct. 7, 1927; Ronongo Island (A. M. No. 79943), male, Oct. 21, 1927.

The forearms of these specimens measure 158.8, 153.3, and 151 mm. respectively. It is the first time this species has been recorded from Ghizo and Ronongo Islands.

### **Pteropus grandis** Thomas.

*Pteropus grandis* Thomas, Ann. and Mag. Nat. Hist., (5), 19, p. 147, 1887.

SOLOMON ISLANDS: Bougainville Island (A. M. No. 79801, 79808), two females (skins only), Jan. 5, 1928, (A. M. No. 79900), female, July 27, 1929, (A. M. No. 79900A), male, Aug. 19, 1929; Mono Island (A. M. No. 79945-46), two females, Dec. 7, 1927; Choiseul Island (A. M. No. 79949), female, Nov. 23, 1927, (A. M. No. 99910), female, Oct. 4, 1929, (A. M. No. 99911), female, Sept. 21, 1929, (A. M. No. 99912, 99918), two females (skins only), Oct. 20, 22, 1929; Ysabel Island (A. M. No. 79875), female (skin only), Aug. 19, 1927, (A. M. No. 79941, 79947), male, female, Sept. 7, 1927, (F. M. No. 31562), male, April 17, 1929.

This species was formerly known from Alu and Bougainville Islands. This series shows a fairly constant color pattern throughout but the males have a slightly lighter back than the females. As Andersen suspected, the females do not have a glandular neck tuft, nor does a young male in the series. The specimen from Choiseul Island has an extra tooth in the lower jaw behind molar three.

The distribution of the *rayneri* group in the Solomon Islands as it is now known is:

*Pteropus cognatus*, San Christoval 4, Ugi 1.

*Pteropus rayneri*, Guadalcanar 8, Malaita 1.

*Pteropus rubianus*, Rubiana 1, Narovo 1.

*Pteropus lavellanus*, Vella Lavella 4, Ghizo 1, Ronongo 1.

*Pteropus grandis*, Alu 2, Bougainville 5, Mono 2, Choiseul 1, Ysabel 4.

***Pteropus nawaiensis* Gray.**

*Pteropus nawaiensis* Gray, Cat. Monk., etc., p. 107, 1870.

FIJI ISLANDS: (A. M. No. 69569-70), one female, one juv. (alc.), Oct. 28, 1924; Taviuni Island (A. M. No. 69566), male (A. M. No. 69566 bis, 69568), male, female (alc.), Dec. 16, 1924.

Recorded from Vana Levu, Viti Levu, Ovalau, and Nauai Islands but there seems to be no other record from Taviuni Island.

***Pteropus samoensis* Peale.**

*Pteropus samoensis* Peale, U. S. Expl. Exp., 8, p. 20, 1848.

SAMOAN ISLANDS: (A. M. No. 68732-35, 69263), two males, three females (alc.), 1924; Tutuila Island (A. M. No. 68726), male (skull only) (A. M. No. 68727-30), three males, one female (alc.), Feb. 1924; Olosenga Island (A. M. No. 68731), female (alc.), Jan. 24, 1924; Savaii Island (A. M. No. 69262), female (alc.), May 17, 1924; Upolu Island (A. M. No. 68722), female (skin with skull inside), April 25, 1924.

This is the first time *samoensis* has been recorded from Olosenga Island. It is found also on Nanua Island.

***Pteropus eotinus* K. Andersen.**

*Pteropus eotinus* K. Andersen, Ann. and Mag. Nat. Hist., (8), 11, p. 469, 1913.

NEW HEBRIDES: Aurora Island (A. M. No. 79967), male, June 24, 1927; Lopevi Island (A. M. No. 79962), female, Aug. 10, 1926; Malekula Island (A. M. No. 73616), one, Aug. 17, 1926, (F. M. No. 31558-59), two males, March 28, 1929; Espiritu Santo Island (F. M. No. 31560), male, April 3, 1929, (A. M. No. 75188), female (skull only), Dec. 4, 1926.

***Pteropus bakeri* Thomas.**

*Pteropus bakeri* Thomas, Ann. and Mag. Nat. Hist., (9), 16, p. 240, 1925.

NEW HEBRIDES: Efate Island (A. M. No. 79966), male (alc.), June 28, 1926; Mau Island (A. M. No. 79965), male (alc.), July 12, 1926; Nguna Island (A. M. No. 79954), male, July 3, 1926.

There are three species of the *samoensis* group found in the New Hebrides: *Pteropus anetianus* Gray, from Aneiteum Island, of which there are no specimens in America; *Pteropus bakeri* Thomas, described from two specimens from Efate or Sandwich Island; and *Pteropus eotinus* Andersen, described from alcoholic specimens from Maewo or Aurora Island. *Pt. bakeri* was compared by Thomas with *anetianus* and unfortunately not with *eotinus*. Baker (Ann. and Mag. Nat. Hist., 1928, (10), 2, p. 295) quotes Thomas as saying: "My *Pt. eotinus*, from Espiritu Santo, may be subspecifically different from the type specimen from Maewo; but

there are not sufficient specimens from Maewo to determine the point."

The collections under consideration contain one topotype of *eotinus* which is immature and agrees rather closely with the description of the paratype; also the skulls have been mixed and the skull may not belong to this specimen. There are also one topotype of *bakeri* in alcohol and two other specimens, one in alcohol and one skin with skull, from islands close enough to the type locality to be considered typical *bakeri*.

There are six specimens from Espiritu Santo, Malekula, and Lopevi Islands, which, while they show marked color differences from the description given for *eotinus*, also show a wide range of color in themselves. The skulls, however, do not show any marked differences which could not be attributed to age. In view of the limited material for comparison of the three species already described, it seems better to refer these last six specimens to *eotinus* until better material can be secured, rather than add another species of this group to the New Hebrides.

### ***Pteropus banksiana* Sanborn.**

*Pteropus banksiana* Sanborn, Am. Mus. Nov., No. 435, p. 1, 1930.

BANKS ISLANDS: Ureparpara or Bligh Island (A. M. No. 79986), male, Nov. 16, 1916. Skin in alcohol, skull removed.

*Pt. banksiana* is the most northern representative of the *samoensis* group and is also its smallest member. It is about the size of *anetiannus* but has a shorter forearm, 117.5 mm., and is of an almost uniform shade of brown. The type is the only specimen known.

### ***Pteropus tuberculatus* Peters.**

*Pteropus tuberculatus* Peters, M. B. Akad. Berlin, p. 393, 1869.

SANTA CRUZ ISLANDS: Vanikoro Island (A. M. No. 79955, 79959), male, female, Sept. 24, 1926, (A. M. No. 79896), female (alc.), Sept. 21, 1926, (A. M. No. 79898), juv. (alc.), Aug. 25, 1926.

These are the only specimens of this species in the United States. Besides the few specimens in Paris, there are eight in the Australian Museum collected by Troughton in 1926 (Rec. Aus. Mus., 1927, 15, p. 355). So far the species is known only from Vanikoro Island.

### ***Pteropus nitendiensis* Sanborn.**

*Pteropus nitendiensis* Sanborn, Am. Mus. Nov., No. 435, p. 2, 1930.

SANTA CRUZ ISLANDS: Santa Cruz Island (A. M. No. 75186, type, 75187), two males, Feb. 24, 1924.

*Pt. niten 'ensis* is a member of the *pselaphon* group and closely related to *tuberculatus* of Vanikoro Island. It has a different color pattern, slightly narrower teeth, and lacks the cusp-like projection on the upper canines.

***Pteropus vampyrus lanensis* Mearns.**

*Pteropus lanensis* Mearns, Proc. U. S. Nat. Mus., 28, p. 432, 1905.

*Pteropus vampyrus lanensis* Andersen, Cat. Chirop., p. 359, 1912.

PHILIPPINE ISLANDS: San Ramon, Mindanao (F. M. No. 33701), male, July 30, 1929.

This is a melanistic specimen with the mantle so mixed with black that the brown scarcely shows.

***Pteropus papuanus* Peters and Doria.**

*Pteropus melanopogon* var. *papua* Peters and Doria, Ann. Mus. Civ. Genoa, 16, p. 690, 1881.

TERRITORY OF NEW GUINEA: Marienberg, forty miles up the Sepik River (F. M. No. 31857), male, May 18, 1929.

This specimen is immature, with a forearm of 176.3 mm. The skull compares favorably with a drawing of *Pt. coronatus* = *Pt. neo-hibernicus* (Thomas, P. Z. S. Lond., 1888, pl. 21, figs. 2, 3, opposite p. 470).

***Pteropus epularis* Ramsay.**

*Pteropus* (*Epomops*?) *epularis* Ramsay, Proc. Linn. Soc. N. S. Wales, 2, p. 8, 1878.

TERRITORY OF NEW GUINEA: Marienberg, forty miles up the Sepik River (F. M. No. 31856), male, May 17, 1929.

This specimen agrees with the description given by Andersen. There is an extra tooth on each side of the skull behind molar two. The species was formerly known from Katow, Yule Island, and the Territory of Papua.

***Pteropus woodfordi* Thomas.**

*Pteropus woodfordi* Thomas, Ann. and Mag. Nat. Hist., (6), 1, p. 156, 1888.

SOLOMON ISLANDS: Kulambangra Island (F. M. No. 31568-70), three males, April 21, 1929.

When taken, these bats were feeding on young green coconuts and were shot by shining the eyes at night. Formerly *woodfordi* was known only from New Georgia and Guadalcanar Islands.

***Pteropus mahaganus* sp. nov.**

*Type* from Tunnibuli, Ysabel or Mahaga Island, East Central Solomon Islands. No. 31563 Field Museum of Natural History.

Adult male. Collected April 17, 1929, by Frank C. Wonder. Orig. No. 247.

*Diagnosis.* Similar to and about the size of *Pt. scapulatus* from Australia, but lighter in color. Skull with wider palate posteriorly and much larger  $m^1$  and  $m_1$ . Front of orbit above anterior half of  $m^1$ . Forearm 131.8 mm. to 143.6.

*Color.*—Type: Back close to Tawny Olive of Ridgway, interspersed with dark brown hairs; mantle and foreneck Light Buff darkened by grayish bases of hairs; a narrow strip of Warm Buff on foreneck; well-developed neck tufts between Tawny and Russet; sides of face and chin sparsely covered with long dark brown hairs; throat Antimony Yellow; breast and belly Warm Buff.

In the four other specimens, three males and one female, the back and rump is Prouts Brown, heavily intermixed with silver gray hairs, less so in the female. The mantle and upper parts are all darker throughout than in the type.

*Skull.*—Type: Brain case deflected; rostrum normal, ascending rami of premaxillae heavy, sagittal crest low, coronoid weak, low and sloping, condyle of mandible on level of alveolar line. Palate wide anteriorly, its edge being nearly parallel. Teeth very weak and narrow, being but slightly larger than in *scapulatus*, with the exception of  $m^2$  and  $m$ , which are much larger. *Pt. woodfordi*, although much smaller, also has these teeth larger than in *scapulatus* but smaller than in *mahaganus*. Upper incisors separated from each other by a space equal to  $i^1$ ; lower middle incisors separated by a wide space;  $i^2$  slightly larger than  $i^1$ . Upper canines long with many grooves, an especially deep one on the anterior face reaching almost to tip, and a narrow internal basal ledge; lower canines with a very narrow internal basal ledge.  $P^1$  about the size of  $i^1$ ;  $p_1$  about the size of  $m_2$ ;  $m^2$  about twice the size of  $m_1$ . One skull has an extra tooth, a mere spicule, on the right hand side behind  $m^1$ .

*Measurements.* Skin of type (minimum and maximum of five specimens given in parentheses): Head and body 223 (201–223); foot 46 (43–48); forearm 143.6 (131.8–143.6); ear 23 (23–25). Skull: Total length 59.9 (54.6–59.9); condylo basal length 58.7 (52.6–58.7); palation to incisive foramina 28.3 (25–28.3); front of orbit to tip of nasals 20.4 (18–20.4); width of brain case at zygomata 22.5 (21.7–22.5); zygomatic width 35.4 (29–35.4); width across  $m^1$  externally 14.9 (13.7–15); width across canines externally 13.5 (11.5–13.5); postorbital constriction 8.2 (8.2–11); interorbital constriction 9

(7.2–9); orbital diameter 12.6 (11.9–12.6); mandible length 43.9 (40.9–43.9); coronoid height 20.5 (16.2–20.5); c–m<sup>2</sup> 19.5 (17.9–19.5); c–m 22.6 (19–22.6); upper incisors, combined width 6.5 (4.6–6.5). Length m<sup>2</sup> 2 (1.7–2), width m<sup>2</sup> 1.7 (1.3–1.7); length m, 1.4 (1.2–1.4), width m, 1.2 (1.1–1.2).

*Remarks.* – *Pteropus mahaganus* is the third member of the *scapulatus* group, the other two being *scapulatus* from Australia and *woodfordi* from Kulambangra, New Georgia, and Guadalcanar Islands in the Solomons. It is distinguished by its very narrow cheek-teeth, wide palate, moderately long, rounded ears, and light-colored mantle. It has the largest m<sup>2</sup> and m, of the three members of the group.

The type and four others collected with it have been examined. The type is the only adult specimen with a sagittal crest, the others being younger. They were shot at night feeding on young green coconuts. A poor skin without skull or sex (A. M. No. 79822), collected Jan. 9, 1928, on Bougainville Island, which has a forearm of 137.6 mm., is provisionally referred to *mahaganus*.

#### ***Acerodon jubatus mindanensis* K. Andersen.**

*Acerodon jubatus mindanensis* K. Andersen, Ann. & Mag. Nat. Hist., (8), 3, pp. 24, 26–29, 1909.

PHILIPPINE ISLANDS: San Ramon, Mindanao (F. M. No. 33702–7), five males, one female, July 30, 1929.

#### ***Pteralopex atrata* Thomas.**

*Pteralopex atrata* Thomas, Ann. and Mag. Nat. Hist., (6), 1, p. 155, 1888.

SOLOMON ISLANDS: Ysabel Island (F. M. No. 31561), male, April 17, 1929.

This is another specimen which was shot at night while feeding on green coconuts. It was the only one of the wounded fruit-bats which showed fight and tried to attack the collectors. Heretofore it has been known from Guadalcanar only.

#### ***Dobsonia moluccensis magna* Thomas.**

*Dobsonia magna* Thomas, Ann. and Mag. Nat. Hist., (7), 16, p. 423, 1905.

*Dobsonia m(oluccensis) magna* K. Andersen, Cat. Chirop., 1, p. 825, 1912.

TERRITORY OF NEW GUINEA: Marienberg, forty miles up the Sepik River (F. M. No. 31850–54), four males, one female, May 17, 1929.

#### ***Dobsonia praedatrix* K. Andersen.**

*Dobsonia praedatrix* K. Andersen, Ann. and Mag. Nat. Hist., (8), 4, p. 532, 1909.

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BISMARCK ARCHIPELAGO: New Britain (A. M. No. 79824-25), two males (79825 skin only), March 21, 1928; New Ireland (A. M. No. 79860), juv., Jan. 12, 1928.

### **Dobsonia nesea** K. Andersen.

*Dobsonia nesea* K. Andersen, Ann. and Mag. Nat. Hist., (8), 4, pp. 532-533, 1909.

SOLOMON ISLANDS: Wainoni Bay, San Christoval (M. C. Z. No. 17213), one (alc.), 1916.

### **Nyctimene scitulus** K. Andersen.

*Nyctimene scitulus* K. Andersen, Ann. and Mag. Nat. Hist., (8), 6, p. 623, 1910.

SOLOMON ISLANDS: Malapa Island (A. M. No. 75197), male, April 21, 1927; Choiseul Island (A. M. No. 99914-15), male, female (alc.), Nov. 4, 1929, (A. M. No. 99916-17), juv. male, female (skins only), Sept. 21, 25, 1929.

Also known from Shortland, New Georgia, Florida, and Guadalcanar Islands in the Solomons.

### **Nyctimene geminus** K. Andersen.

*Nyctimene geminus* K. Andersen, Ann. and Mag. Nat. Hist., (8), 6, p. 623, 1910.

LOUISIAD ARCHIPELAGO: Goodenough Island (A. M. No. 79805), male, Nov. 22, 1928, (A. M. No. 79830), one (alc.), Nov. 18, 1924.

### **Macroglossus lagochilus lagochilus** Matschie.

*Macroglossus lagochilus* Matschie, Megachir., p. 96, 1899.

PHILIPPINE ISLANDS: San Ramon, Mindanao (F. M. No. 33027), male, July 31, 1929.

The mandible of this specimen shows another abnormality for the genus as there is but one incisor on each side and m, on the left side is but half the size of the right molar. The forearm measures 38.6 mm.

### **Macroglossus lagochilus microtus** K. Andersen.

*Macroglossus australis* (pt., nec Peters), Thomas, P. Z. S. Lond., p. 476, 1888.

*Carponycteris nana* (pt., nec Matschie), Trouessart, Cat. Mamm., Suppl., p. 65, n. 560, 1904.

*Macroglossus lagochilus microtus* K. Andersen, Ann. and Mag. Nat. Hist., (8), 7, p. 642, 1911.

SOLOMON ISLANDS: San Christoval Island (A. M. No. 99944-45), two females (alc.), Nov. 1929.

This species is known from two specimens from Guadalcanar, the type locality, and from one other taken on Florida. These two

from San Christoval appear to be the first recorded since the description by Andersen in 1911.

### ***Nesonycteris woodfordi* Thomas.**

*Nesonycteris woodfordi* Thomas, Ann. and Mag. Nat. Hist., (5), 19, p. 147, 1887.

SOLOMON ISLANDS: Pavuvu or Russell Island (A. M. No. 79912), male, Aug. 6, 1927.

This specimen appears to be a little darker in color than indicated by the original description. It is new from this island.

### ***Notopteris macdonaldi* Gray.**

*Notopteris macdonaldi* Gray, P. Z. S. Lond., p. 38, 1859.

FIJI ISLANDS: Colombo Cave, near Suva, Viti Levu Island (F. M. No. 31571-31610), fifteen males, nineteen females, six juv. (F. M. No. 31164-31340), eleven adult males, forty-three juv. males, sixty-seven adult females, forty-six juv. females (alc.), March 22, 1929.

Andersen records specimens from Kalambon Cave, R. Wainimanu, and from caves at Kolobo, both localities probably synonymous with Colombo Cave, but the correct spelling could not be found. All these specimens from Colombo Cave were taken with a few shots fired simultaneously. The roof of the cave was about sixty feet high and in the dark no idea could be gained of how many bats were hanging there. Besides those saved, the natives took some home to eat.

### ***Emballonura semicaudata* (Peale).**

*Vespertilio semicaudata* Peale, U. S. Expl. Exped., Mammalia, p. 23, pl. iii, fig. 2, 1848.

*Emballonura semicaudata* Wagner, Suppl. Schreb. Saugeth., 5, p. 698, 1855.

FIJI ISLANDS: Suva, Viti Levu Island (F. M. No. 31646-59), eight males, two females, four skulls only (F. M. No. 31512-18), seven (alc.), March 12, 21, 1929, (A. M. No. 69574-76), three (alc.), 1925.

SAMOAN ISLANDS: Tau Island, Manua Group (A. M. No. 68827-34, 68836), nine (alc.), Dec. 26, 1923.

### ***Emballonura nigricans solomonis* Thomas.**

*Emballonura nigricans solomonis* Thomas, Ann. and Mag. Nat. Hist., (7), 14, p. 200, 1904.

SOLOMON ISLANDS: Wainoni Bay, San Christoval (M. C. Z. No. 17230-33), large series (three examined) (alc.), 1916; Savo Island (A. M. No. 75175-77), two males, one female, June 3, 1927; Bauro Island (A. M. No. 75178-79), two males (skins only), March 18, 1927; Pavuvu Island (A. M. No.



79861), male (skin only), Aug. 6, 1927; Vella Lavella Island (A. M. No. 79862), female, Oct. 18, 1927.

TERRITORY OF NEW GUINEA: Nissan Island (A. M. No. 99903, 2 specimens, 99905), three (alc.), Aug. 6, 1929.

No locality (A. M. No. 79910, 79993-80000), nine (alc.).

### **Emballonura cor** Thomas.

*Emballonura cor* Thomas, Ann. and Mag. Nat. Hist., (8), 15, p. 139, 1915.

SOLOMON ISLANDS: Ysabel Island (M. C. Z. No. 17299), one (alc.), 1916.

### **Rhinolophus sedulus** K. Andersen.

*Rhinolophus sedulus* K. Andersen, Ann. and Mag. Nat. Hist., (7), 16, p. 247, 1905.

BRITISH NORTH BORNEO: Tenosa River, Sandakan (F. M. No. 33029), male, Aug. 23, 1929.

This specimen is slightly more grayish than the description of the type but this may be a sexual difference. It was caught in the day-time hanging in a bush in a mangrove swamp.

### **Hipposideros calcaratus** Dobson.

*Phyllorhina calcaratas* Dobson, P. Z. S. Lond., p. 122, fig. 8, 1877.

*Hipposideros calcaratus* Jentink, Nova Guinea, 5, liv. 2, p. 363, 1903.

TERRITORY OF NEW GUINEA: Nissan Island (A. M. No. 99904, 99906-7), three males (alc.), Aug. 6, 1929.

This species is known from Duke of York Island and northwestern New Guinea. It is new to Nissan Island. Jentink (l. c.) says "not recorded from New Guinea since 1872."

### **Hipposideros diadema oceanitis** K. Andersen.

*Hipposideros diadema oceanitis* K. Andersen, Ann. and Mag. Nat. Hist., (7), 16, p. 497, 1905.

SOLOMON ISLANDS: Ysabel Island (M. C. Z. No. 17215), one (alc.), 1916; Vella Lavella Island (A. M. No. 79869-72), three males, one female, Oct. 18, 1927; Bougainville Island (A. M. No. 79823), male (skin only), (A. M. No. 79876-86), eleven (alc.), Jan. 4, 1928.

### **Hipposideros cervinus** (Gould).

*Rhinolophus cervinus* Gould, Mammals of Australia, 3, text to pl. 34, 1863.

*Hipposideros cervinus* Jentink, Nova Guinea, 5, liv. 2, p. 363, 1903.

NEW HEBRIDES: (A. M. No. 79968), one (alc.) (skull removed) (A. M. No. 79969-82), fifteen (alc.), 1926; Espiritu Santo Island (F. M. No. 31611-35), twelve males, thirteen females (F. M. No. 31441-31511), sixty-one (alc.), April 1, 5, 1929; Efate Island (A. M. No. 73620-21), two, July 15, 1926; Malo Island (A. M. No. 73622), one, Aug. 27, 1926.

SANTA CRUZ ISLANDS: Fenualoa Island (A. M. No. 75180), one, Oct. 11, 1926.

TERRITORY OF NEW GUINEA: Marienberg, forty miles up the Sepik River (F. M. No. 31817-21), five skulls only, May 18, 1929.

### ***Hipposideros tricuspidatus* (Temminck).**

*Rhinolophus tricuspidatus* Temminck, Monogr. Mamm., 2, p. 20, pl. XXXII, figs. 11-12 (skull), 1835-41.

*Hipposiderus tricuspidatus* Trouessart, Cat. Mamm., Suppl., p. 70, 1904.

SOLOMON ISLANDS: Ugi Island (F. M. No. 31660), female, April 10, 1929.

SANTA CRUZ ISLANDS: Santa Cruz Island (A. M. No. 75181-82, 75185), three males, Feb. 25, 26, 1927.

No data (A. M. No. 79911), one (alc.).

### ***Anthops ornatus* Thomas.**

*Anthops ornatus* Thomas, Ann. and Mag. Nat. Hist., (6), 1, p. 156, 1888; P. Z. S. Lond., p. 477, pl. 22, fig. 1, 1888.

SOLOMON ISLANDS: Choiseul Island (A. M. No. 99908), female (alc.), Sept. 16, 1929.

This is apparently the first specimen taken since the collection of the type series from Guadalcanar.

### ***Leuconoe moluccarum* Thomas.**

*Leuconoe moluccarum* Thomas, Ann. and Mag. Nat. Hist., (8), 15, p. 170, 1915.

TERRITORY OF NEW GUINEA: Sepik River, Koragu (F. M. No. 31822-23), one female, one juv. (F. M. No. 32576-32604), twenty-nine (alc.), May 23, 25, 1929; Nyomonga, south of Koragu (F. M. No. 52572-75), four (alc.), May 23, 1929; Nissan Island (A. M. No. 99901-2), two males, four females, (3 specimens on each number), Aug. 6, 1929.

In an adult female skull, one of five removed from the Field Museum alcoholic series,  $p^1$  is in the toothrow and is visible from without, instead of being internal and in the angle between  $p^1$  and  $p^4$ . Likewise  $p_1$  is less crushed between  $p_1$  and  $p_4$ . In a very young skull the molars are about half through and, on one side, the canine and  $p^1$  and  $p^1$  are just appearing in the upper jaw. In the mandible the incisors and  $m_1$  have the greatest development. The specimens from Koragu and Nyomonga were found in pots, drums, and other utensils in the native houses. A few miles down the river at Marienberg they were not seen. This seems strange when they were collected on Nissan Island, although the season might account for it.

### ***Myotis muricola* (Gray).**

*Vespertilio muricola* Gray, Cat. Mamm., etc., Nepal and Thibet, p. 4, 1846.

*Myotis muricola* Thomas, Jour. Bomb. Nat. Hist. Soc., 23, No. 4, p. 609, 1915.

BRITISH NORTH BORNEO: Sandakan (F. M. No. 32689), male, July 5, 1929.

The forearm of this specimen measures 36 and the total length of the skull 13. It was found hanging on a bush.

**Pipistrellus papuanus papuanus** Peters and Doria.

*Pipistrellus papuanus* Peters and Doria, Ann. Mus. Genova 16, p. 696, 1881.

TERRITORY OF NEW GUINEA: Sepik River, Koragu (F. M. No. 31824), male, May 25, 1929.

BRITISH NEW GUINEA: Wareo (A. M. No. 79773), one, April 12, 1929.

**Scoteinus greyii** (Gray).

*Scotophilus greyii* Dobson, P. Z. S. Lond., p. 372, 1875.

*Scoteinus greyii* Miller, Fam. Gen. Bats, p. 217, 1907.

BRITISH NEW GUINEA: Port Moresby (F. M. No. 33780 81), two, Dec. 1917. Collected by J. T. Zimmer. "Caught in a butterfly net."

Records of this species from New Guinea are few. Besides these two specimens there is one in the Australian Museum from East Cape, Port Moresby, collected by Kendall Broadbent in December 1878. Thomas (Ann. Mus. Genova, 1897, p. 609) records twenty-seven specimens from Kamali, close to the mouth of the Kemp-Welch River, and one from Aroma, collected by Loria. These localities are east of Port Moresby near the coast. Mr. Zimmer's specimens compared with one from Lincoln, North Territory, Australia (U. S. N. M. No. 237973), are much smaller in both skin and skull measurements. A larger series might show some subspecific differences.

**Miniopterus australis** Tomes.

*Miniopterus australis* Tomes, P. Z. S. Lond., p. 125, 1858.

NEW HEBRIDES: Malo Island (F. M. No. 31636 45), five males, five females (F. M. No. 31341 31440), one hundred (alc.), March 30, 1929.

This species is also recorded by Thomas (Ann. & Mag. Nat. Hist., 1925, (9), 16, p. 241) from Villa, Efate Island.

**Miniopterus schreibersii magnater** subsp. nov.

*Type* from Marienberg, forty miles up the Sepik River, Territory of New Guinea. No. 31802 Field Museum of Natural History. Adult male. Collected May 17, 1929, by Frank C. Wonder. Orig. No. 284.

*Diagnosis*.—Much larger and darker than typical *M. schreibersii* from Europe; the largest and darkest subspecies known.

*Color*.—Upper parts uniform Mummy Brown of Ridgway and under parts close to Bone Brown of Ridgway.

*Measurements.*—Skin of type (minimum and maximum of twelve skins and ten spirit specimens in parentheses): Forearm 51.4 (48.4–51.4). Skull of type (minimum and maximum of eleven specimens in parentheses): Condyle basal length 17 (16.5–17.1); zygomatic width 10.1 (9.7–10.1); upper toothrow, c–m<sup>2</sup> 7 (6.8–7.1); across m<sup>1</sup>–m<sup>1</sup>, externally 7.9 (7.6–7.9).

*Specimens examined.*—Total twenty-seven, twelve skins, ten alcoholics, and five skulls only, all from the type locality.

*Remarks.*—This appears to be the first series of these bats received from northern New Guinea. Dobson lists one specimen and Jentink (Nova Guinea, 5, liv. 2, p. 364, 1903) one. Jentink's specimen, however, had a forearm of only 40 mm. so it may have been *M. pusillus*. The closest named form is *M. s. blepotis* Temminck from Java which has a forearm of 42–44 mm. Compared with a series from Nodoo, Hainan, China, questioningly called *blepotis* by Dr. G. M. Allen, *magnater* is darker, and the skulls average larger, the minimum measurements equaling the maximum in the series from Nodoo, but the forearms are the same. Its large skull and dark color will identify *magnater*. The specimens were collected by a native in a cave about ten miles from Marienberg.

### **Kerivoula hardwicki** (Horsfield).

*Vespertilio hardwickii* Horsfield, Zool. Res. in Java, 1825.

*Kerivoula hardwickii* Gray, Ann. Nat. Hist., (1), 10, p. 258, 1842.

PHILIPPINE ISLANDS: San Ramon, Mindanao (F. M. No. 33028), female, Aug. 2, 1929.

There are but few other records from the Philippines.

### MEGACHIROPTERA DESCRIBED SINCE 1912

*Rousettus (Lissonycteris) crypticola* Cabrera, Bol. Soc. Esp. Hist. Nat., 20, p. 106, 1920. Africa: Fernando Po.

*Pteropus arquatus* Miller and Hollister, Proc. Biol. Soc. Wash., 34, p. 100, 1921. Middle Celebes: Koelawi.

*Pteropus bakeri* Thomas, Ann. and Mag. Nat. Hist., (9), 16, p. 240, 1925. New Hebrides: Efate or Sandwich Island.

*Pteropus balutus* Hollister, Proc. Biol. Soc. Wash., 26, p. 111, 1913. Philippine Islands: Balut Island, Serangani Group, south of Mindanao.

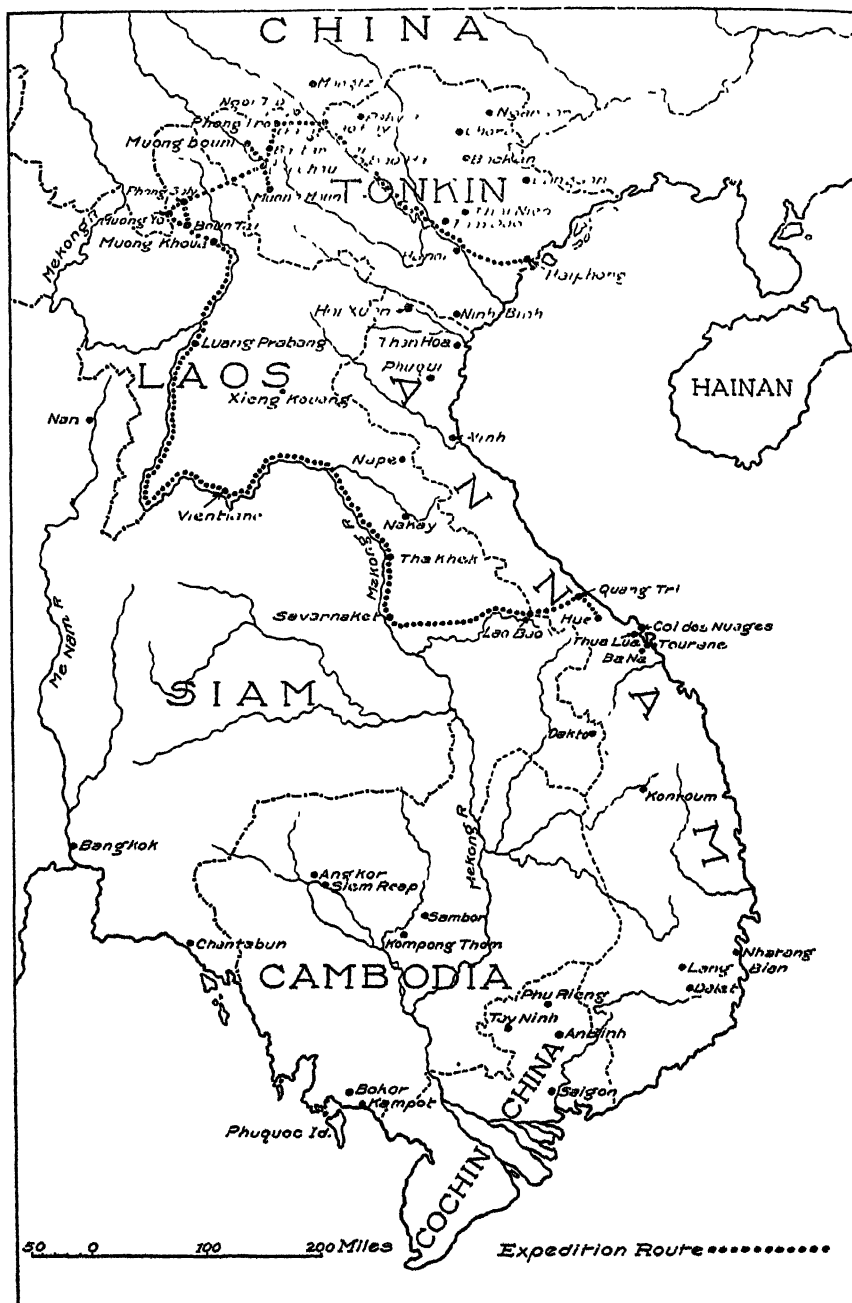
*Pteropus banksiana* Sanborn, Am. Mus. Nov. No. 435, p. 1, 1930. Banks Islands: Ureparpara or Bligh Island.

- Pteropus basiliscus* Thomas, Ann. and Mag. Nat. Hist., (8), 15, p. 387, 1915. Territory of New Guinea: Dampier Island.
- Pteropus daitoensis* Kuroda, Jour. Mamm., 2, p. 210, 1921. Japan: Kita Daitojima Island, Daito Islands, S. E. Loo Choo Group.
- Pteropus eotinus* K. Andersen, Ann. and Mag. Nat. Hist., (8), 11, p. 469, 1913. New Hebrides: Aurora or Maiwo Island.
- Pteropus hypomelanus fretensis* Kloss, Jour. Fed. Malay States Mus., 6, pt. 4, p. 247, 1916. Straits of Malacca: Pulau Jarak.
- Pteropus mearnsi* Hollister, Proc. Biol. Soc. Wash., 26, p. 112, 1913. Philippine Islands: Isabella, Basilan Island.
- Pteropus nitendiensis* Sanborn, Am. Mus. Nov. No. 435, p. 2, 1930. Santa Cruz Islands: Santa Cruz or Nitendi Island.
- Pteropus rennelli* Troughton, Rec. Aus. Mus. 17, No. 4, p. 193, 1929. Solomon Islands: Rennell Island.
- Pteropus hypomelanus simalurus* Thomas, Ann. and Mag. Nat. Hist., (9), 12, p. 592, 1923. Simalur Islands: Pulu Tapah, northwest of Sumatra.
- Pteropus vulcanius* Thomas, Ann. and Mag. Nat. Hist., (8), 15, p. 388, 1915. Territory of New Guinea: Vulcan Island.
- Dobsonia anderseni* Thomas, Ann. and Mag. Nat. Hist., (8), 13, p. 435, 1914. Admiralty and Ruk Islands: Type from Manus Island.
- Dobsonia remota* Cabrera, Bol. Soc. Esp. Hist. Nat., 20, p. 107, 1920. New Guinea: Trobriand Island.
- Cynopterus babi* Lyon, Proc. U. S. Nat. Mus., 52, p. 438, 1916. Sumatra: Pulo Babi.
- Dyacopterus brooksi* Thomas, Ann. and Mag. Nat. Hist., (9), 5, p. 284, 1920. Sumatra: Upper Ketaun River.
- Aethalodes alecto* Thomas, Ann. and Mag. Nat. Hist., (9), 11, p. 251, 1923. Sumatra: Indrapua Peak.
- Aethalops* nom. n. pro. *Aethalodes* preocc. Thomas, P. Z. S. Lond., p. 178, 1923.
- Nyctimene celaeno* Thomas, Ann. and Mag. Nat. Hist., (9), 9, p. 262, 1922. North New Guinea.
- Nyctimene tryoni* Longman, Mem. Queensland Mus., 7, p. 179, 1920. South Queensland: Canungra.
- Nyctimene vizcaccia* Thomas, Ann. and Mag. Nat. Hist., (8), 13, p. 436, 1914. Bismarck Archipelago: Ruk Island.

*Eonycteris robusta* Miller, Proc. Biol. Soc. Wash., 26, p. 73, 1913.  
Philippine Islands: Montalban, Luzon.

*Macroglossus minimus fratensis* Chasen and Kloss, P. Z. S. Lond.,  
p. 836, 1927. West Sumatra: Sipora Island.

*Harpionycteris celebensis* Miller and Hollister, Proc. Biol. Soc. Wash.,  
34, p. 99, 1921. Middle Celebes: Gimpoe.



MAP SHOWING COLLECTING LOCALITIES AND ROUTE

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BIRDS OF  
THE KELLEY-ROOSEVELTS EXPEDITION  
TO FRENCH INDO-CHINA

BY

OUTRAM BANGS

CURATOR OF BIRDS, MUSEUM OF COMPARATIVE ZOOLOGY

AND

JOSELYN VAN TYNE

ASSISTANT CURATOR OF BIRDS, UNIVERSITY OF MICHIGAN

WILFRED H. OSGOOD

CURATOR, DEPARTMENT OF ZOOLOGY

EDITOR



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# BIRDS OF THE KELLEY ROOSEVELTS EXPEDITION TO FRENCH INDO-CHINA

BY OUTRAM BANGS AND JOSSELYN VAN TYNE

The collection of birds here reported upon was made in 1929 by the Indo-China division of the William V. Kelley-Roosevelts Expedition of Field Museum. This division consisted of a party of four, organized and led by Harold J. Coolidge, Jr., whose special interest was mammals. Dr. Ralph E. Wheeler was the physician, but also collected indefatigably at every opportunity. Russell W. Hendee, although primarily in charge of the mammal collecting, secured a large number of birds, especially in the region north of Lai Chau. To the junior author, Dr. Josselyn Van Tyne, was given the primary responsibility for bird collecting and to that most of his time was devoted. Loyal help was received from P. Jabouille's two Annamese assistants, Ut and Tuong, who were with the expedition throughout. During part of the time there was also other native assistance.

This report deals only with collections made in Tonkin and Laos. The party also spent nine days in January collecting near Quang Tri, Annam, and there secured thirty-three additional forms, making a total of four hundred and twenty species and subspecies collected by the expedition in Indo-China.

After leaving Ngai T'io on February 20, 1929, the expedition worked until early July in regions almost wholly unknown to zoologists. The only previous bird collection was a small number of skins collected by F. R. Wulsin for the United States National Museum during a hasty trip (April-August, 1924) through a part of the region covered by the Kelley-Roosevelts Expedition. His collection has never been reported upon.

There were two principal regions worked. The drainage system of the Riviere Noire in northern Tonkin was the first of these. The second was Phong Saly in northern Laos and the area to the west of it, all drained by the Nam Hou River. In addition, every possible opportunity for collecting en route was utilized fully. At Vientiane in southern Laos it was possible to spend four days collecting while awaiting transportation down the Mekong River.

Except for a month (March 7 April 9) in the Lai Chau region the four members of the expedition operated as a single unit until May 14 when Hendee started alone on his ill-fated attempt to join the Roosevelts in Annam. He traveled via the Nam Hou and Mekong Rivers, the same route later followed by the main party. The specimens which he secured en route are from the same localities but are dated several weeks earlier than the dates listed beyond in the itinerary of the main party.

The accompanying map, gazetteer, and itinerary should make clear the identity and location of the places from which specimens are listed.

The task of working over this collection of more than three thousand specimens comprising three hundred and eighty-seven species has been carried on at the Museum of Comparative Zoology of Harvard College. In addition the junior author visited the Rothschild Museum at Tring and spent a short time working in the British Museum of Natural History. Earlier in the work a number of specimens were sent to the British Museum for examination by N. B. Kinnear, who helped greatly with his opinions. Other questions were settled by J. H. Riley and Dr. C. W. Richmond of the United States National Museum. James L. Peters frequently rendered aid and advice of especial value. To all of these gentlemen grateful acknowledgment is made.

The colors of soft parts here recorded were personally noted in the field by the junior author and the nomenclature is that of Ridgway's Color Standards and Color Nomenclature (1912). The color names from Ridgway are here capitalized. All measurements of specimens are in millimeters unless otherwise stated and are given in the same order as are listed the specimens from which they were taken. The sequence of families is that proposed by Dr. Wetmore (Proc. U. S. Nat. Mus., 76, p. 1, 1930).

## ITINERARY

### TONKIN

February 11 to 15 at Chapa (32 km. from Lao Kay).

February 19, Lao Kay to Muong Um (50 km.).

February 20 to Ngai Tio (17 km.).

February 21 to Ye Yen Sun (19 km.).

February 22 to Phong Tho (25 km.).

February 22 to 26 at Phong Tho.

February 26 to Bac Tan Trai (via Nam Na River).

February 27 to Lai Chau (via Nam Na River).

February 27 to March 7 at Lai Chau.

### WHEELER AND VAN TYNE TO MUONG MOUN AND RETURN

March 7 to Pa Ham (about 25 km.).

March 7 to 9 at Pa Ham.

March 9 to Nam Nen (about 15 km.).

March 10 to Muong Moun (about 18 km.).

March 10 to April 5 at Muong Moun.  
 April 5 to Nam Nen.  
 April 6 to Pa Ham.  
 April 6 to 9 at Pa Ham.  
 April 9 to Lai Chau.

COOLIDGE AND HENDREE TO MUONG BOUM  
 AND RETURN

March 7 to Ba Nam Yon (about 30 km.).  
 March 8 to Ba Nam Nhung (about 10 km.).  
 March 8 to 12 at Ba Nam Nhung.  
 March 12 to Muong Mo (about 23 km. via Ba Nam Cai).  
 March 12 to 20 at Muong Mo.  
 March 20 to Nong Lum (about 30 km.).  
 March 21 to Muong Boum (about 18 km.).  
 March 21 to 29 at Muong Boum.  
 March 29 to Pa Mo (via Nam Boum and Nam Mo Rivers).  
 March 30 and 31 to Lai Chau via Riviere Noire.

HENDREE TO MAO XAO PHING AND RETURN

April 2 to Chieng Chan.  
 April 4 to 7 at Lieng San.  
 April 8 to Mao Xao Phing.  
 April 14, Lai Chau to Nam Hê (30 km.).  
 April 15 to Muong Tia (30 km.).  
 April 16 to Can Ho (30 km.).  
 April 17 to Pou Den Dinh (25 km.).  
 April 17 to 19 at Pou Den Dinh.

LAOS

April 19 to Pinh Hô (26 km.).  
 April 20 to Lao Fou Tchai (35 km.).

April 20 to 22 at Lao Fou Tchai.

April 22 to Hatsa (34 km.).  
 April 23 to Phong Saly (22 km.).  
 April 23 to May 7 at Phong Saly.  
 May 7 to Dun Nua (43 km.).  
 May 8 to Muong Yo (30 km.).  
 May 8 to 21 at Muong Yo.  
 May 21 to Boun Tai.  
 May 21 to June 2 at Boun Tai.  
 June 2 to Kouei Soun (20 km.).  
 June 3 to Muong Chao Noi (20 km.).  
 June 4 to Phong Saly (30 km.).  
 June 5 to Hatsa (22 km.).

By water to Savannakhet (July 6);  
 Hatsa to Pak Hou, via Nam Hou  
 River; Pak Hou to Savannakhet,  
 via Mekong River.

June 6 to Ban Khana (about 40 km.).  
 June 7 to Muong Khoua (about 45 km.).  
 June 8 to Faux Hatsa.  
 June 9 to Muong Ngoi.  
 June 10 to Ban Ten Khen (about 36 km.).  
 June 11 to Lat Te.  
 June 12 to Pak Hou and Luang Prabang.  
 June 12 to 18 at Luang Prabang.  
 June 18 to Pak Si.  
 June 19 to 22, Pak Si to Paklay.  
 June 22 to 25, Paklay to Vientiane.  
 June 25 to July 5 at Vientiane.  
 July 5 to Paksane.  
 July 6 to Savannakhet.  
 July 7 to Huê by automobile (via  
 Tcephone and Quang Tri).

## LIST OF LOCALITIES

*Ba Nam Cai (Tonkin).* On the Nam Nhung River just above Ba Nam Nhung. Also spelled Ba Nam Kai.

*Ba Nam Nhung (Tonkin).*—Village of forty huts on a branch of the Riviere Noire. Second growth forest and low hills with clearings along the stream for rice fields. Also spelled Ba Nam Nhon, or Nhum.

*Bac Tan Trai (Tonkin).*—Alt. 650 ft. Small village on the left bank of the Nam Na River about 20 km. southwest of Phong Tho. Also spelled Pac Tan Trai on some maps.

*Ban Don Men (Laos).*—Small village on the right bank of the Mekong River below Paklay.

*Ban Khana (Laos).*—Small Laotian village on the left bank of the Nam Hou River about 40 km. below Hatsa.

*Ban Ten Khon*.—Small village on right bank of Nam Hou about 36 km. below Muong Ngoi.

*Boun Neua (Laos)*. Small military post and village in a flat valley surrounded by high forested hills. Considerable open park country in the valley. Excellent place for Gaur and Sambur. A few natural salt licks. Also spelled Bun Nua.

*Boun Tai (Laos)*.—Alt. about 1,900 ft. Important Lu village and small French fort on the Nam Leng River. Largely cleared but with some good forest near the village. Also written Muong Boun Tai (or Tay).

*Chapa (Tonkin)*.—Alt. 4,300 ft. Expedition base at Hotel Chapa but collecting was carried on a thousand feet down to "Ville de la Cascade" and up Mt. Fan-si-pan nearly a thousand feet. Some good forest close at hand (forest preserves). Chapa is an important "hill-station" 36 km. by auto road southwest of Lao Kay.

*Chiang Chan (Tonkin)*.—Alt. 600 ft. Near Lai Chau.

*Hatsa (Laos)*.—Alt. 1,400 ft. Native village on the right bank of the Nam Hou River, 22 km. east of Phong Saly. Not to be confused with the Laotian village of the same name (but usually called Faux Hatsa by the French) three days' journey down the river and on the left bank. Also written Hat Sa.

*Lai Chau (Tonkin)*.—Alt. 500 ft. Important village at the junction of the Riviere Noire and the Nam Na Rivers. French post commanding the whole region. No forest left near-by.

*Lao Kay (Tonkin)*.—Large town on the Fleuve Rouge at the Yunnan border. The point at which the expedition left the railroad. Also spelled Lao Kai.

*Lao Fou Tchai (Laos)*.—Alt. 3,400 ft. Chinese village of several dozen houses on a high barren hillside. Very rough country. Nearly all the country around is artificial savanna, with here and there a few trees or brush patches and distant several miles a few very small patches of isolated forest.

*Laeng San (Tonkin)*.—Alt. 4,900 ft. On plateau near Mao Xao Phing.

*Luang Prabang (Laos)*.—Capital of the kingdom of Luang Prabang. At the junction of the Nam Khan and Mekong Rivers.

*Makomen (Laos)*.—See *Phong Saly*.

*Mao Xao Phing (Tonkin)*.—Alt. about 5,200 ft. High plateau thirty miles north of Lai Chau. Inhabited by Meos. Largely grassland with patches of original forest.

*Muong Boum (Tonkin).*—Important Thai village and small military post. Rice fields along the valley of the Nam Boum River. Lower slopes of mountains forested. On the higher slopes of the mountains that surround the village is considerable bamboo jungle and tall grass burned frequently by the Meos.

*Muong Khoua (Laos).*—Important native village and small French outpost on the Nam Hou River at the mouth of the Nam Pak River.

*Muong Mo (Tonkin).*—On the Mo River, a branch of the Riviere Noire.

*Muong Moun (Tonkin).*—Alt. 1,200 ft. Important Thai village. Country diversified and much changed by man but some large forest left. The Thais and the Meos from the surrounding hills brought in a large number of the specimens preserved here.

*Muong Ngoi (Laos).*—Alt. about 1,200 ft. Important Laotian village and small French outpost on the left bank of the Nam Hou River. Surrounded by precipitous limestone mountains.

*Muong Yo (Laos).*—Alt. 2,300 ft. Small Lu village west of Phong Saly and about 10 km. from the Chinese border. Rice fields about the village but much good virgin forest close by.

*Nam Nen (Tonkin).*—Alt. about 750 ft. Small Thai village between Pa Ham and Muong Moun. Forest entirely destroyed.

*Ngoi Tio (Tonkin).*—Alt. about 4,500 ft. Thomas (P. Z. S. Lond., 1925, p. 499) lists it as 4,800 ft. Stone rest-house and small native village on the east side of the Col de Nuages Pass (not to be confused with the "Col de Nuages" in Annam where Delacour worked). This was an important collecting base of H. Stevens (Kinnear, 1929). Splendid forest from here to the pass at 7,000 ft. Also spelled Nagi Cho or Ngoi-Tio (Bull. Brit. Orn. Cl., 45, p. 74-5).

*Nong Lunn (Tonkin).*—Small forested hollow on the top of a mountain range. Alt. over 5,000 ft. Surrounding country largely tall grass. No village.

*Pa Ham (Tonkin).*—Alt. 500 ft. Small Thai village on the Meuk River. Precipitous hills all about. Some good forest remaining near the village.

*Pak Hou (Laos).*—Point of entry of the Nam Hou River into the Mekong. High limestone cliffs harboring many swallows and bats.

*Pak Si (Laos).*—Small village on the left bank of the Mekong River about 80 km. below Luang Prabang.

*Phalane (Laos).*—Village on the main auto road between Savannakhet, Laos, and Quang Tri, Annam. About one-third of the way from Savannakhet.

*Phong Saly (Laos).*—Alt. 4,400 ft. Large native town with a French post and prison. Also spelled Phong Sali. Mountainous region. Valleys more than 2,000 ft. deep all about. Country entirely deforested except for a few sacred groves and French forest reserves of perhaps one to three acres each. The natives (Pu Noi) are great trappers and brought in a great many birds and mammals. Most of the collecting was actually done from a base at the village of Makomen, about 5 km. south-southeast of Phong Saly.

*Phong Tho (Tonkin).*—Alt. 1,020 ft. Important native village and small French fort on the Nam Na River. Surrounded by forested hills. Forest much cut and altered.

*Pou Den Dinh (Tonkin).*—Alt. 3,100 ft. Rest-house close to the border of Laos. Very hilly country; largely savanna but with some second growth forest left. Situated on the divide between the valley of the Mekong and the Riviere Noire. Also spelled Phu Den Dinh.

*Pyn Ho (Laos).*—Alt. 4,000 ft. Rest-house on route between Lai Chau and Phong Saly. Country for the most part recently burned over. Also called Sala Pyn Ho, or (on one map) merely Sala.

*Tcephone (Laos).*—Village on the main auto route from Savannakhet to Quang Tri, Annam. East of Phalane.

*Vientiane (Laos).*—Alt. less than 500 ft. Capital of Laos. All specimens labeled Vientiane were collected about the rest-house and village of Tha Ngon, 24 km. north-northeast of the city. Very flat country with diversified vegetation which included some large forest.

*Ye Yen Sun (Tonkin).*—Alt. 2,800 ft. Small village at the west base of the "Col de Nuages" on the route between Lao Kay and Phong Tho. Country nearly all cleared.

***Poliocephalus ruficollis poggei* (Reichenow). CHINESE LITTLE GREBE.**

*Colymbus nigricans poggei* Reichenow, Journ. f. Orn., 50, p. 125, 1902—Tschili, China.

TONKIN: Lai Chau, one ♂, April 2.

Delacour has used the name *philippensis* for Indo-Chinese birds but our specimen agrees entirely in the light color of its back with examples of *poggei* from China.

**Anhinga melanogaster** Pennant. INDIAN SNAKE BIRD.

*Anhinga melanogaster* Pennant, Ind. Zool., 13, pl. 12, 1769—India.

LAOS: Mekong River, near Paklay, one unsexed, about May 31 (Hendee).

The Snake Bird was first noted by the main party on June 20 about halfway between Luang Prabang and Paklay. Single birds were seen at intervals thereafter but were too wary to be collected.

**Ixobrychus cinnamomeus** (Gmelin). CHESTNUT BITTERN.

*Ardea cinnamomea* Gmelin, Syst. Nat., 1, p. 643, 1789—China.

TONKIN: Lai Chau, one ♂, March 3; Muong Moun, two ♂♂, March 27, April 1; Muong Mo, one ♂, March 12.

LAOS: Muong Yo, five ♂♂, May 16 to 19; Boun Tai, one ♂, two ♀♀, May 27 to 31.

**Gorsachius melanolophus melanolophus** (Raffles). MALAY BITTERN.

*Ardea melanolophus* Raffles, Trans. Linn. Soc., 13, p. 326, 1822—Sumatra.

TONKIN: Muong Moun, one adult ♂, April 2.

Iris about Strontian Yellow, skin of face pale Windsor Blue, legs and feet Citrine Drab in front and Ecru Olive behind, soles of feet Isabella Color.

This rare Bittern was found in a native pheasant dead-fall in a dry bamboo thicket several hundred feet from the nearest water.

**Butorides striatus javanicus** (Horsfield). INDIAN LITTLE GREEN HERON.

*Ardea javanica* Horsfield, Trans. Linn. Soc., 13, p. 190, 1821—Java.

TONKIN: Nam Na River between Bar Tan Trai and Lai Chau, one ♂ (wing 201), Feb. 27; Muong Moun, one ♀ (wing 178), March 21; Ba Nam Nhung, one ♂ (wing 185), March 11; Muong Mo, one ♀ (wing 180), March 16.

We do not consider Stresemann's recently described *connectens* (Orn. Monat., 38, p. 48, 1930) worthy of recognition.

**Ardeola bacchus** (Bonaparte). CHINESE POND HERON.

*Buphus bacchus* Bonaparte, Consp. Gen. Av., 2, p. 127, 1857—Malay Peninsula.

TONKIN: Muong Boum, one ♂, March 26.

**Ibis leucocephalus** (Gmelin). PAINTED STORK.

*Tantalus leucocephalus* Gmelin, Syst. Nat., 1, p. 649, 1789—Ceylon.

LAOS: Mekong River, 30 miles above Paklay, one ♀, June 21; Mekong River, Ban Don Men, one ♀, June 23.



Iris Pinkish Buff, bill Deep Chrome at the base to Olive Lake at the tip, forehead Ochraceous Orange.

The Painted Stork was first noted on the Mekong on June 20 about halfway between Luang Prabang and Paklay. Many were seen between June 20 and 25 but they were difficult to approach.

**Leptoptilus javanicus** (Horsfield). SMALLER ADJUTANT.

*Ciconia javanica* Horsfield, Trans. Linn. Soc., 13, p. 188, 1821—Java.

TONKIN: Chieng Chan, one ♀, April 2.

**Pseudibis davisoni** (Hume). DAVISON'S BLACK IBIS.

*Geronticus davisoni* Hume, Stray Feathers, 3, p. 300, 1875—Tenasserim.

LAOS: Mekong River, about 40 and 20 miles above Paklay, one ♂, one ♀, June 20, 21.

Iris Orange Chrome, bill Olive Gray at the tip to Clear Green Blue Gray at the base, collar Burn Blue on the nape to bluish white on the throat, legs and feet Deep Vinaceous (adult ♀).

Black Ibises were first noted on June 20 about halfway between Luang Prabang and Paklay. They were frequently seen thereafter, usually in small flocks.

**Dendrocygna javanica** (Horsfield). COMMON WHISTLING TEAL.

*Anas javanica* Horsfield, Trans. Linn. Soc., 13, p. 200, pl. 1, 1821—Java.

LAOS: Vientiane, one ♂, one breeding ♀, July 3.

**Baza lophotes burmana** Sclater. BURMESE BLACK-CRESTED BAZA.

*Baza lophotes burmana* Sclater, Bull. Brit. Orn. Cl., 41, p. 31, 1920—Malewoun, Tenasserim.

TONKIN: Muong Moun, one ♀, March 10; Muong Mo, one ♂, March 16.

LAOS: Boun Tai, one ♀, May 29.

**Pernis apivorus ruficollis** Lesson. INDIAN CRESTED HONEY BUZZARD.

*Pernis ruficollis* Lesson, Traité d'Orn., p. 77, 1830—Bengal.

TONKIN: Phong Tho, one ♂, Feb. 24; Muong Moun, one ♀, April 1.

LAOS: Nam Hou River near the mouth, one ♂, May 21 (Hendee).

Our specimens have short crests, which are however rather longer than in *orientalis*, a form also distinguished by having the first primary longer than the secondaries. In *ruficollis*, on the other hand, the first primary is of the same length or (more frequently) shorter. The banding of the tail in this species is very inconstant

and cannot be used as a taxonomic character as was attempted by Stuart Baker. Adult birds assume gray heads and the adult plumage can always be so recognized.

**Accipiter nisus nisosimilis** (Tickell). ASIATIC SPARROW HAWK.

*Falco nisosimilis* Tickell, Journ. As. Soc. Bengal, 2, p. 571, 1833—Borabhum, Bengal.

TONKIN: Chapa, two ♀ ♀, Feb. 13.

Both birds had two equal ovaries.

**Astur trivirgatus rufitinctus** (McClelland). NORTHERN CRESTED GOSHAWK.

*Spizaetus rufitinctus* McClelland, P. Z. S. Lond., 1839, p. 153—Burhampooter River, Assam.

TONKIN: Phong Tho, one ♂ (wing 235), Feb. 25.

Iris Cadmium Yellow, cere Olive Yellow, feet Yellow Ochre.

**Astur gentilis** subsp. GOSHAWK.

TONKIN: Muong Moun, one immature ♂ (wing 305), March 22.

This single specimen is in immature plumage and is therefore not identifiable as to subspecies in the present very incomplete state of our knowledge of the many races of this species. Kuroda's single specimen from Lao Kay (1917, p. 218) is apparently the only previous record from Indo-China.

**Circus melanoleucus** (Forster). PIED HARRIER.

*Falco melanoleucus* Forster, Ind. Zool., 1781, p. 2, pl. 12—Ceylon.

TONKIN: Muong Moun, two ♂ ♂, one ♀, March 24 to April 2.

Iris Citron Yellow, feet about Light Orange Yellow.

**Ichthyophaga humilis plumbeus** (Jerdon). HIMALAYAN GRAY-HEADED FISHING EAGLE.

*Polioaëtus plumbeus* Jerdon, Ibis, 1871, p. 336—n. w. Himalayas.

TONKIN: Nam Na River between Bac Tan Trai and Lai Chau, one ♂ (wing 420), Feb. 27.

This Fishing Eagle has not been found before in Indo-China.

**Butastur indicus** (Gmelin). GRAY-FACED BUZZARD EAGLE.

*Falco indicus* Gmelin, Syst. Nat., 1766, p. 264—Java.

TONKIN: Lai Chau, one ♂, Feb. 28.

**Spilornis cheela burmanicus** Swann. BURMESE SERPENT EAGLE.

*Spilornis cheela burmanicus* Swann, Synop. List Accipitr., 1920, p. 81—Jobin, Thayetmyo, Burma.

TONKIN: Muong Boum, one ♂, March 25.

LAOS: Muong Yo, one ♂, May 18.

The Tonkin specimen is somewhat darker but is still referable to *burnanicus*, although Delacour (1929, p. 212) considers Tonkin specimens to be *ricketti*.

The stomach of the Muong Yo bird contained a twelve-inch snake.

**Ictinaëtus malayensis perniger** (Hodgson). INDIAN BLACK EAGLE.

*Heteropus perniger* Hodgson, Journ. As. Soc. Bengal, 5, p. 227, 1836—Nepal.

TONKIN: Mao Xao Phing, one ♂ (wing 560), April 3; Lieng San, one ♂ (wing 565), April 6.

**Falco tinnunculus interstinctus** McClelland. HIMALAYAN KESTREL.

*Falco interstinctus* McClelland, P. Z. S. Lond., 1840, p. 154—Assam.

TONKIN: Muong Moun, one ♀ (wing 240), March 19.

**Microhierax melanoleucus melanoleucus** (Blyth). INDIAN WHITE-LEGGED FALCONET.

*Ierax melanoleucus* Blyth, Journ. As. Soc. Bengal, 12, p. 179, 1843—Assam.

TONKIN: Muong Moun, one ♂, one ♀, March 20, 27.

As Baker has stated (Birds Brit. Ind., 5, p. 54) the form *sinensis* is probably not recognizable. Several Fukien specimens in the Museum of Comparative Zoology have no white nape feathers at all.

These birds had been eating small beetles and other insects.

**Tropicoperdix chloropus olivacea** Delacour and Jabouille. GREEN-LEGGED HILL PARTRIDGE.

*Tropicoperdix chloropus olivacea* Delacour and Jabouille, Bull. Brit. Orn. Cl., 48, p. 129, 1928—Napé, Laos.

TONKIN: Muong Moun, three ♂♂, five ♀♀, March 11 to 18; Muong Mo, one ♂, two ♀♀, March 16 to 19.

**Arborophila brunneopectus henrici** (Oustalet). BROWN-BREASTED HILL PARTRIDGE.

*Arboricola henrici* Oustalet, Bull. Mus. Paris, 1896, p. 317—Tonkin and Quang Tri, Annam.

TONKIN: Nam Nen, one ♀ (captive bird), March 10; Muong Moun, seven ♂♂, three ♀♀, March 14 to 23.

As Delacour has stated (1929, p. 200), this species is extremely variable in markings and the form *neveni* described by him cannot be recognized.

**Excalfactoria chinensis chinensis** Linnaeus. BLUE-BREASTED QUAIL.

*Tetrao chinensis* Linnaeus, Syst. Nat., 12th ed., p. 277, 1766—China.

TONKIN: Mao Xiao Phing, four ♂♂, five ♀♀, April 8, 9.

**Bambusicola fytchii fytchii** Anderson. YUNNAN BAMBOO PARTRIDGE.

*Bambusicola fytchii* Anderson, P. Z. S. Lond., 1871, p. 214, pl. 11—Ponsee, Yunnan.

TONKIN: Chapa, one ♂ (captive bird), Feb. 15; Ngai Tio (near), one ♀, Feb. 20; Muong Moun, three ♀♀, March 17 to 25; Muong Mo, five ♂♂, five ♀♀, March 13 to 17; Lieng San, one ♂, one ♀, April 6.

LAOS: Phong Saly, one ♂, April 25; Muong Yo, one ♂, May 16.

The Bamboo Partridge is apparently confined to the northern border of Indo-China.

**Gennaeus nycthemerus ripponi** Sharpe. YUNNAN SILVER PHEASANT.

*Gennaeus ripponi* Sharpe, Bull. Brit. Orn. Cl., 13, p. 29, 1902—South Shan Hills.

TONKIN: Muong Moun, three ♂♂, one ♀, March 16 to 26.

LAOS: Phong Saly, one adult ♂, one adult ♀, three downy young, April 29–30.

Iris Orange Cinnamon, face Dragon's Blood Red, legs and feet Nopal Red (adult ♀, Muong Moun).

**Gallus gallus jabouillei** Delacour and Kinnear. JABOUILLE'S JUNGLE FOWL.

*Gallus gallus jabouillei* Delacour and Kinnear, Bull. Brit. Orn. Cl., 49, p. 49, 1928—Bakan, n. e. Tonkin.

TONKIN: Lai Chau, one adult ♂, April 11; Muong Moun, three adult ♂♂, March 11 to April 3; Ba Nam Nhung, one adult ♂, March 10; Muong Mo, one adult ♂, March 16; Muong Boum, one adult ♂, March 26.

LAOS: Phong Saly, one adult ♀, April 29; Muong Yo, two ♀♀, May 20.

Iris Brazil Red, bare skin of head Vandyke Red, legs about Dark Gull Gray (old breeding ♂, Muong Moun).

All of these males had red ear-lappets, while a specimen secured at Quang Tri, Annam (*Gallus g. gallus*) had white ear-lappets.

**Polyplectron bicalcaratum bicalcaratum** (Linnaeus). BURMESE PEACOCK PHEASANT.

*Pavo bicalcaratus* Linnaeus, Syst. Nat., 10th ed., 1, p. 156, 1758—China-Burma, restricted to Thoungyah.

TONKIN: Lai Chau, three adult ♂♂, March 2 to April 13; Muong Moun, ten ♂♂, ten ♀♀, March 12 to April 1; Muong Boum, two ♂♂, March 25 to 28.

Iris white, orbital skin Chamois, nostrils Deep Mouse Gray, distal half of maxilla Dusky Green Gray, rest of bill Light Mouse Gray, legs and feet Castor Gray.

Our series shows some variation in the character of the buffy ring about the ocelli of the tail. Several specimens have the ring nearly complete as in *Polyplectron bicalcaratum ghigii* Delacour and Jabouille (Bull. Brit. Orn. Cl., 45, p. 30, 1924).

**Turnix maculatus maculatus Vieillot. BURMESE BUTTON QUAIL.**

*Turnix maculatus* Vieillot, Nouv. Dict. d'Hist. Nat., 35, p. 47, 1819—Assam.  
TONKIN: Muong Moun, one ♂, March 26.

**Turnix suscitator blakistoni (Swinhoe). CHINESE BUSTARD QUAIL.**

*Areoturnix blakistoni* Swinhoe, P. Z. S. Lond., 1871, p. 401—Canton.

TONKIN: Muong Moun, two ♂♂, one ♀, March 22 to 26; Mao Xao Ping, four ♂♂, three ♀♀, April 3 to 9.

LAOS: Phong Saly, two ♂♂, April 27 to May 3.

Iris Light Buff, bill about Clear Green Blue Gray, feet Hathi Gray (pair from Muong Moun).

**Porphyrio poliocephalus edwardsi Elliot. EDWARDS PURPLE MOORHEN.**

*Porphyrio edwardsi* Elliot, Ann. and Mag. Nat. Hist., (5), 1, p. 98, 1878—Cochin China and Siam.

LAOS: Vientiane, six ♂♂ (wing 240, 225, 257, 240, 245, 233), July 3.

**Amaurornis phoenicurus chinensis (Boddaert). CHINESE WHITE-BREASTED WATERHEN.**

*Fulica chinensis* Boddaert, Tabl. Pl. Enlum., 1783, p. 54—Hongkong.

TONKIN: Phong Tho, one ♀, Feb. 24; Muong Moun, two ♂♂, one ♀, March 12 to 25; Ba Nam Nhung, one ♂, March 11.

LAOS: Muong Yo, four ♂♂, two ♀♀, May 9 to 19; Boun Tai, two ♂♂, May 28 to 31; Nam Hou River below Muong Ngoi, one ♀, June 10.

Iris Hays Russet, bill Vinaceous Rufous to Mignonette Green, legs Old Gold.

Wing: ♂♂ 152, 166, 161, 170, 159, 165, 158; ♀♀ 159, 141, 146, 151, 166, 155, 152.

**Corethrura fusca erythrothorax** (Temminck and Schlegel).  
CHINESE RUDDY CRAKE.

*Gallinula erythrothorax* Temminck and Schlegel, Siebold's Faun. Jap. Av.,  
p. 121, pl. 28, 1849 Japan.

LAOS: Long Nai (s. w. of Boun Tai), one ♀ (wing 163), May 27.

**Porzana bicolor** Walden. RUFOUS-BACKED CRAKE.

*Porzana bicolor* Walden, Ann. and Mag. Nat. Hist., (4), 9, p. 47, 1872—  
Darjeeling.

LAOS: Phong Saly, one ♂ (wing 119), May 4.

Iris Vinaceous Rufous, orbital skin Apricot Orange, bill Apple  
Green to Chaetura Drab at tip, legs Apricot Orange to Hazel.

**Hypotaenidia striata** (Linnaeus). BLUE-BREASTED BANDED RAIL.

*Rallus striatus* Linnaeus, Syst. Nat., 1766, p. 262—Philippines.

LAOS: Muong Yo, one ♀ (wing 124), May 12; Long Nai (s. w. of Boun Tai),  
one ♀ (wing 123), May 27.

**Rostratula benghalensis benghalensis** (Linnaeus). PAINTED  
SNIPE.

*Rallus benghalensis* Linnaeus, Syst. Nat., 1, 1758, p. 153—Asia.

TONKIN: Ba Nam Nhung, one ♀, March 10.

**Hydrophasianus chirurgus** (Scopoli). PHEASANT-TAILED JACANA.

*Tringa chirurgus* Scopoli, Del. Flor. et Faun. Insubr., 2, p. 92, 1786—Luzon.

LAOS: Muong Yo, two ♂♂, May 12, 20.

**Sarcogrammus indicus atronuchalis** (Blyth). BURMESE RED-  
WATTLED LAPWING.

*Lobivanellus atronuchalis* Blyth, Jerdon's Birds of India, 3, p. 648, 1864—  
Burma.

LAOS: Muong Yo, two ♂♂, three ♀♀, May 9 to 19; Boun Tai, two ♂♂,  
May 22, 28.

**Hoplopterus ventralis** (Wagler). SPUR-WINGED PLOVER.

*Charadrius ventralis* Wagler, Syst. Av., p. 59, 1827—Calcutta.

TONKIN: Bac Tan Trai, one ♀, Feb. 26; Nam Na River between Bac Tan  
Trai and Lai Chau, one ♂, Feb. 27; Lai Chau, one ♂, one ♀, March 3.

The Spur-winged Plover was rather common on the banks and  
sand bars of the Nam Na River below Bac Tan Trai.

**Charadrius dubius jerdoni** (Legge). JERDON'S LITTLE RINGED  
PLOVER.

*Aegialitis jerdoni* Legge, P. Z. S. Lond., 1880, p. 39—Ceylon and Central  
India.

TONKIN: Lai Chau, two ♂♂ (wing 109, 107), two ♀♀ (wing 111, 107),  
March 4 to April 1.

Orbital skin Light Cadmium.

**Capella stenura** (Bonaparte). PINTAIL SNIPE.

*Scolopax stenura* Bonaparte, Ann. Stor. Nat. Bologna, 4, p. 335, 1830—Sunda  
Islands.

TONKIN: Mao Xao Phing, one ♀, April 9.

**Scolopax rusticola rusticola** Linnaeus. WOODCOCK.

*Scolopax rusticola* Linnaeus, Syst. Nat., 1, p. 146, 1758—Europe.

TONKIN: Chapa, one ♂, Feb. 15.

**Actitis hypoleucos** (Linnaeus). COMMON SANDPIPER.

*Tringa hypoleucos* Linnaeus, Syst. Nat., 1, p. 148, 1758—Europe.

TONKIN: Nam Na River below Phong Tho, one ♂, Feb. 26; Lai Chau, one ♀,  
March 3; Ba Nam Nhung, one ♂, one ♀, March 11.

**Tringa ocropus** Linnaeus. GREEN SANDPIPER.

*Tringa ocropus* Linnaeus, Syst. Nat., 1, 1758, p. 149—Europe.

TONKIN: Lai Chau, two ♂♂, two ♀♀, March 3 to 4; Ba Nam Nhung, one  
♂, March 10.

**Seena aurantia** (J. G. Gray). INDIAN RIVER TERN.

*Sterna aurantia* J. G. Gray, Hardw. Ill. Ind. Zool., 1, pl. 69, fig. 2, 1832—India.

LAOS: Pak Si (Mekong River), immature ♀, June 18.

This was the only species of tern seen on the Mekong River. At  
Paklay on June 22 terns were seen in numbers for the first time.

**Macropygia ruficeps assimilis** Hume. BURMESE LITTLE CUCKOO  
DOVE.

*Macropygia assimilis* Hume, Stray Feathers, 2, p. 441, 1874—Tenasserim.

TONKIN: Muong Mo, one ♂, one ♀, March 12 to 14; Muong Boum, one ♂,  
March 26.

LAOS: Muong Yo, one ♂, May 15.

**Macropygia unchall tusalia** (Hodgson). BAR-TAILED CUCKOO  
DOVE.

*Coccyzura tusalia* Hodgson, Journ. As. Soc. Bengal, 14, p. 309, 1843—Nepal.

TONKIN: Lai Chau, one immature ♂, March 1.

LAOS: Phong Saly, one adult ♂, April 20.

Delacour (1928, p. 33) lists his specimens as *minor* (of Hainan), but Hartert (Novit. Zool., 17, p. 194, 1910) has shown that *minor* can not be separated from *tusalia*.

***Streptopelia orientalis orientalis* (Latham). RUFous TURTLE DOVE.**

*Columba orientalis* Latham, Ind. Orn., 2, p. 606, 1790—China.

TONKIN: Lai Chau, one ♀, March 2; Muong Moun, one ♂, March 14; Ba Nam Nhung, one ♀, March 9; Muong Mo, one ♀, March 16.

***Streptopelia chinensis tigrina* (Temminck). BURMESE SPOTTED DOVE.**

*Columba tigrina* Temminck, Les Pigeons, p. 94, 1810—Java.

TONKIN: Phong Tho, one ♀, Feb. 24; Lai Chau, one ♀, March 1; Muong Moun, three ♂♂, March 21 to 27; Muong Mo, one ♂, March 19.

LAOS: Muong Yo, one ♂, May 10; Vientiane, one ♂, July 2.

***Ducula badia griseicapilla* Walden. GRAY-HEADED IMPERIAL PIGEON.**

*Ducula griseicapilla* Walden, Ann. Mag. Nat. Hist., (4), 16, p. 228, 1875—Karen Hills.

LAOS: Pyn Ho, one ♂, one ♀, April 19; Phong Saly, five ♂♂, four ♀♀, April 24 to May 1.

Iris about Pale Gull Gray, bill about Drab, feet and base of bill Perilla Purple (Pyn Ho pair).

These specimens have already been listed by Conover in his paper on *Ducula badia obscurata* (Proc. Biol. Soc. Wash., 43, p. 2, 1930).

***Muscadivora aenea sylvatica* (Tickell). INDIAN GREEN IMPERIAL PIGEON.**

*Columba sylvatica* Tickell, Journ. As. Soc. Bengal, 2, p. 581, 1833—Borabhum.

LAOS: Muong Yo, three ♂♂, May 10 to 16.

Iris Victoria Lake, eye ring Madder Brown, base of maxilla Deep Livid Brown, distal half of maxilla Clear Green Blue Gray, mandible Castor Gray, feet about Mineral Red.

***Chalcophaps indica indica* (Linnaeus). INDIAN EMERALD DOVE.**

*Columba indica* Linnaeus, Syst. Nat., 1, p. 164, 1758—East Indies, restricted to Calcutta.

TONKIN: Muong Moun, three ♀♀, March 15 to April 3; Ba Nam Nhung, one ♂, March 11; Muong Boum, two ♂♂, March 26, 28.

LAOS: Muong Yo, one ♂, one ♀, May 19; Boun Tai, two ♂♂, May 26 to 29.



The little Emerald Dove was seen rather frequently at Muong Moun.

**Sphenurus apicauda laotianus** Delacour. PIN-TAILED GREEN PIGEON.

*Sphenurus apicauda laotianus* Delacour, Bull. Brit. Orn. Cl., 47, p. 10, 1926—Xieng Kouang, Laos.

TONKIN: Pou Den Dinh, one ♂, one ♀, April 18; Phong Saly, two ♂♂, three ♀♀, April 28 to May 4.

Iris about Light Salmon Orange, horny bill about Pea Green, base of bill Calamine Blue, feet Spectrum Red (Pou Den Dinh pair).

**Sphenurus sphenurus yunnanensis** (La Touche). WEDGE-TAILED GREEN PIGEON.

*Sphenocercus sphenurus yunnanensis* La Touche, Bull. Brit. Orn. Cl., 42, p. 13, 1921—Lotukow, s. e. Yunnan.

TONKIN: Muong Boum, one ♂, March 25.

Our specimen is exactly like the type and another male from Yunnan except that it has less conspicuous dark shaft stripes on the under tail coverts.

**Treron curvirostra nipalensis** (Hodgson). THICK-BILLED GREEN PIGEON.

*Toria nipalensis* Hodgson, As. Res., 19, p. 164, 1836—Nepal.

LAOS: Hatsa (10 km. east of), one ♂, April 22; Muong Yo, four ♂♂, three ♀♀, May 12 to 19; Boun Tai, three ♂♂, two ♀♀, May 22 to 27; Vientiane, one ♂, July 2.

Iris Cadmium Yellow, orbital skin about Viridine Green, bill about Lime Green (base about Garnet Brown), feet about Carmine (Muong Yo ♂).

This species was noted as breeding at Muong Yo and Boun Tai.

**Treron pompadora phayrei** (Blyth). ASHY-HEADED GREEN PIGEON.

*Osmotreron phayrei* Blyth, Journ. As. Soc. Bengal, 31, p. 344, 1862—Tounghoo.

LAOS: Boun Tai, one adult ♀, May 28.

**Rhopodytes tristis longicaudatus** (Blyth). MALAY GREEN-BILLED MALKOHA.

*Phoenicophanes longicaudatus* Blyth, Journ. As. Soc. Bengal, 10, p. 923, 1841—Moulmein.

TONKIN: Phong Tho, one ♂, Feb. 25; Pa Ham, one ♀, March 8; Muong Moun, three ♂♂, one ♀, March 21 to April 3; Ba Nam Nhung, one ♂, March 11; Muong Mo, two ♂♂, two ♀♀, March 16 to 19; Muong Boum, one ♂, March 27.

LAOS: Muong Yo, one ♂, May 13; Boun Tai, one ♀, May 28; Vientiane, one ♀, June 30.

After examining the series in the British Museum we are convinced that the form *hainanus* can not be recognized.

**Centropus sinensis intermedius (Hume). HUME'S CROW PHEASANT.**

*Centrocoryx intermedius* Hume, Stray Feathers, 1, p. 454, 1873—Thaetmyo.

TONKIN: Phong Tho, immature ♂, Feb. 25; Lai Chau, one ♂, April 1; Muong Moun, two ♂♂, one unsexed, March 11 to 31; Muong Mo, two ♂♂, one ♀, March 12 to 17.

LAOS: Muong Yo, one ♀, May 14; Boun Tai, two ♀♀, May 28 to 30.

Iris Carmine.

Wing: adult ♂♂ 203, 201, 198, 201, 205; adult ♀♀ 218, 221, 214.

**Eudynamis scolopacea chinensis Cabanis and Heine. CHINESE KOEL.**

*Eudynamis chinensis* Cabanis and Heine, Mus. Hein., pt. 4, sec. 1, p. 52, 1862—Canton.

TONKIN: Muong Boum, one ♂, March 26; Chieng Chan, one ♂, April 2.

LAOS: Muong Yo, two ♂♂, May 9.

**Clamator coromandus (Linnaeus). RED-WINGED CRESTED CUCKOO.**

*Cuculus coromandus* Linnaeus, Syst. Nat., 1766, 1, 171—Coromandel Coast.

LAOS: Boun Tai, one ♂, one ♀, May 26.

**Surniculus lugubris dicuroides (Hodgson). INDIAN DRONGO CUCKOO.**

*Pseudornis dicuroides* Hodgson, Journ. As. Soc. Bengal, 8, p. 136, 1839—Nepal.

TONKIN: Pa Ham, one ♂, April 6; Muong Moun, two ♂♂, one ♀, April 1 to 3; Pou Den Dinh, one ♂, one ♀, April 18.

LAOS: Phong Saly, one ♂, May 2; Boun Tai, two ♂♂, one ♀, May 26 to 31; Vientiane, one ♀, July 2.

**Chalcites maculatus (Gmelin). EMERALD CUCKOO.**

*Trogon maculatus* Gmelin, Syst. Nat., 1, 1788, p. 404—Ceylon = Pegu desig. by Rob. and Kloss.

TONKIN: Muong Moun, one ♀, April 3; Chieng Chan, one ♂, April 2.

The Emerald Cuckoo has not previously been found in Tonkin.

**Cacomantis merulinus querulus** Heine. BURMESE PLAINTIVE CUCKOO.

*Cacomantis querulus* Heine, Journ. f. Orn., 11, p. 352, 1863—Nepal.

LAOS: Lao Fou Tchai, one ♂, April 21; Boun Tai, one ♂, May 22.

**Cuculus sparverioides** Vigors. LARGE HAWK CUCKOO.

*Cuculus sparverioides* Vigors, P. Z. S. Lond., 1831, p. 173—Simla-Almora Districts.

TONKIN: Lai Chau, one ♂, April 1; Muong Moun, one ♂, March 20; Nong Lum, one ♂, March 20; Muong Boum, one ♂, March 25.

LAOS: Muong Yo, one ♀, May 18.

Iris Mars Yellow, orbital skin and feet Cadmium Yellow, nares and mandible Yellowish Olive, maxilla black (Muong Moun ♂).

Specimens taken at Muong Yo were in breeding condition.

**Cuculus micropterus micropterus** Gould. INDIAN CUCKOO.

*Cuculus micropterus* Gould, P. Z. S. Lond., 1837, p. 137—Himalayas.

LAOS: Muong Yo, two ♂♂, May 9 to 16.

**Cuculus canorus bakeri** Hartert. KHASIA HILLS CUCKOO.

*Cuculus canorus bakeri* Hartert, Vog. Pal. Fauna, 2, 7, p. 948, 1912 Shillong, Khasia Hills.

TONKIN: Muong Moun, one ♂, April 2; Mao Xao Phing, one ♂, April 3.

LAOS: Lao Fou Tchai, one ♂, one ♀, April 21.

This Cuckoo has not been taken before in Indo-China. In addition to those collected a number were heard calling in March and April in northern Tonkin and Laos.

**Psittacula alexandri fasciata** (Müller). INDIAN RED-BREASTED PAROQUET.

*Psittacus fasciatus* Müller, Nat. Syst. Suppl., p. 74, 1776—Pondicherry.

TONKIN: Muong Mo, one ♂, March 18.

**Psittacula schisticeps finschi** (Hume). BURMESE SLATY-HEADED PAROQUET.

*Palaeornis finschi* Hume, Stray Feathers, 2, p. 509, 1874—Kollidoo.

LAOS: Lao Fou Tchai, four ♂♂, April 21; Boun Tai, one ♀, May 22.

Iris Marguerite Yellow, cere Yellow Ocher, mandible and distal third of maxilla about Primuline Yellow, proximal two-thirds of maxilla about Brazil Red (♂).

**Glaucidium brodiei tubiger** (Hodgson). EASTERN COLLARED  
PIGMY OWLET.

*Noctua tubiger* Hodgson, As. Res., 19, p. 175, 1836—Nepal.

TONKIN: one ♂ (wing 83), Feb. 14.

Iris Lemon Yellow, bill Mignonette Green, feet Deep Grape Green, soles Olive Yellow.

This specimen is in the gray phase.

**Glaucidium cuculoides rufescens** Baker. BURMESE BARRED  
OWLET.

*Glaucidium cuculoides rufescens* Baker, Bull. Brit. Orn. Cl., 47, p. 59, 1926—  
Noon-zai-han, Manipur.

TONKIN: Ngai Tio, one ♀, Feb. 20; Lai Chau, one ♂, March 2; Muong Moun, one ♂, three ♀ ♀, March 11 to 28; Muong Mo, two ♀ ♀, March 17, 19; Muong Boum, one ♂, March 23.

LAOS: Muong Yo, one ♂, one ♀, May 10, 17; Boun Tai, one ♀, May 26; Vientiane, two ♂ ♂, one ♀, June 30 to July 2.

Iris Lemon Chrome, bill and cere Ecru Olive, feet Dark Olive Buff (Lai Chau ♂).

Delacour has called Tonkin specimens *whiteleyi*, but ours are separable from a series of twenty-five from south China by their much more rufous color and wider black barring of the tail. Three specimens from Szemao, Yunnan, were listed by Rothschild (Novit. Zool., 34, p. 39) as *G. c. cuculoides*, but we have examined them and would include them with our northern Indo-Chinese series.

The stomachs examined contained grasshoppers, beetles, and other large insects.

**Otus spilocephalus latouchei** (Rickett). LA TOUCHE'S SPOTTED  
SCOPS OWL.

*Scops latouchei* Rickett, Bull. Brit. Orn. Cl., 10, p. 56, 1900—Ah Chung, Fukien.

TONKIN: Chapa (near), one ♀ (wing 150), Feb. 14.

This specimen was collected in a cave 8 km. south of Chapa (alt. about 4,300 ft.). The form *latouchei* is a close but recognizable subspecies of *spilocephalus* of India. We have compared our specimen with the type of *latouchei* in the British Museum.

**Otus bakkamoena lettia** (Hodgson). BURMESE COLLARED SCOPS  
OWL.

*Scops lettia* Hodgson, As. Res., 19, p. 176, 1836—Nepal.

TONKIN: Ba Nam Nhung, one ♀ (wing 177), March 9.

**Ketupa flavipes** (Hodgson). TAWNY FISH OWL.

*Cultrunguis flavipes* Hodgson, Journ. As. Soc. Bengal, 5, p. 364, 1836—Nepal.  
TONKIN: Muong Mo, one ♀, March 18.

**Strix leptogrammica laotiana** Delacour. LAOTIAN WOOD OWL.

*Strix newarensis laotianus* Delacour, Bull. Brit. Orn. Cl., 47, p. 11, 1926—  
Dakto, Annam.

LAOS: Phong Saly, one ♀ (wing 390), April 29.

Our single specimen agrees fairly well with Delacour's description of *laotiana* except that nearly the whole facial disc is black, only the extreme periphery being touched with buff.

**Lyncornis cerviniceps cerviniceps** Gould. BURMESE GREAT EARED NIGHTJAR.

*Lyncornis cerviniceps* Gould, Icon. Av., 2, pl. 4, 1838—China.

LAOS: Ban Don Men (on Mekong River below Paklay), one ♂ (wing 297),  
June 22.

**Caprimulgus asiaticus asiaticus** Latham. COMMON INDIAN NIGHTJAR.

*Caprimulgus asiaticus* Latham, Ind. Orn., 2, p. 588, 1790—India.

LAOS: Vientiane, two ♂♂, three ♀♀, July 3.

**Caprimulgus indicus jotaka** Temminck and Schlegel. JAPANESE JUNGLE NIGHTJAR.

*Caprimulgus jotaka* Temminck and Schlegel, Faun. Jap., p. 37, 1847—Japan.

LAOS: Phong Saly, one ♀, April 26; Ban Don Men, one adult ♂, one immature ♂, June 22.

**Hemiprocne coronata** (Tickell). INDIAN CRESTED SWIFT.

*Hirundo coronata* Tickell, Journ. As. Soc. Bengal, 2, p. 580, 1883—Borabhum,  
Bengal.

LAOS: Phalane (18 km. west of), one ♂, one ♀, July 7.

**Collocalia francica germaini** Oustalet. OUSTALET'S GRAY-RUMPED SWIFT.

*Collocalia germaini* Oustalet, Bull. Soc. Philom. Paris, 1, p. 1, 1876—Cochin  
China.

LAOS: Nam Hou River near Ban Ten Khen, one adult ♂ (wing 123), June 11.

**Collocalia brevirostris pellos** Thayer and Bangs. HIMALAYAN SWIFTLET.

*Collocalia inopina pellos* Thayer and Bangs, Mem. Mus. Comp. Zool., 40,  
p. 158, 1912—Waschan, Szechwan.

TONKIN: Lai Chau, one ♂ (wing 134), March 5; Muong Moun, one ♂ (wing 138), March 27.

These two specimens are very similar to the type series of *pellos* in the Museum of Comparative Zoology. We have also compared our specimens with the British Museum *Collocalias* and find that the specimen on which Kinnear (1929, p. 124) based his record of *C. innominata* in Tonkin is actually not that species but *pellos*. Kinnear's record is the only previous one for this Swiftlet in Indo-China.

The type of *Collocalia inopina* Thayer and Bangs (Bull. Mus. Comp. Zool., 52, p. 139, 1909) from Hupeh remains unique and is certainly very similar to some specimens of *pellos*. In case the two prove indistinguishable the name *inopina* will have to replace *pellos*. We follow Stresemann (Mitteil. Zool. Mus. Berlin, 12, 1926, p. 351) in considering *pellos* a race of *Collocalia brevirostris*.

### **Collocalia brevirostris innominata** Hume. HUME'S SWIFTLET.

*Collocalia innominata* Hume, Stray Feathers, 1, p. 294, 1873—Button Is., Andamans.

TONKIN: Lai Chau, two ♂♂ (wing 124, 128), one ♀ (wing 127), March 4 to 6.

This is the first record of Hume's Swiftlet in Indo-China. Kinnear's (1929, p. 124) record from Tonkin proves to refer to *pellos*. We have compared our specimens with the type and a series of seven in the British Museum and find ours somewhat darker below. Perhaps further material will show that Tonkin specimens are separable from Andaman birds.

### **Hirundapus giganteus indicus** (Hume). BROWN-THROATED SPINETAIL.

*Chactura indica* Hume, Stray Feathers, 1, p. 471, 1873—Andamans.

LAOS: Muong Yo, two ♂♂, four ♀♀, May 10 to 20.

Wing: ♂♂ 206, 199; ♀♀ 207, 193.

These magnificent Swifts were seen rather frequently over the rice fields of Muong Yo where they were feeding on dragon flies, beetles, and other insects. Because of their great speed of flight and tenacity of life they proved very difficult to collect even under these favorable conditions.

### **Cypsiurus balasiensis infumatus** (Sclater). EASTERN PALM SWIFT.

*Cypselus infumatus* Sclater, P. Z. S. Lond., 1865, p. 602—Bangermassing, Borneo.

LAOS: Boun Tai, two ♀ ♀, May 28; Muong Ngoi, one ♀, June 9; Ban Ten Khen (on Nam Hou River), three ♂ ♂, two ♀ ♀, June 10, 11; Tcephone, one unsexed, July 7.

This Swift was breeding in the palm trees in the village of Ban Ten Khen.

As Oberholser has shown (Proc. U. S. Nat. Mus., 28, p. 860, 1905) these Swifts are not congeneric with *Tachornis phoenicobia*. But Oberholser's new name, *Tachynantes*, is not necessary for *Cypsiurus* of Lesson is not preoccupied by *Cypsilurus* of Swainson.

**Apus pacificus cooki** (Harington). BURMESE WHITE-RUMPED SWIFT.

*Cypselus pacificus cooki* Harington, Bull. Brit. Orn. Cl., 31, p. 57, 1913—Goteik Caves, Northern Shan States.

LAOS: Tcephone, one ♀ (wing 162), July 7.

This one specimen, collected by Wheeler while passing through the village of Tcephone, shows very well the streaked throat and rump, the darker back, and smaller size of *cooki*.

**Apus affinis subfurcatus** (Blyth). MALAYAN HOUSE SWIFT.

*Cypselus subfurcatus* Blyth, Journ. As. Soc. Bengal, 18, p. 807, 1849—Penang. TONKIN: Lai Chau, one ♀, March 6.

**Pyrotrogon erythrocephalus intermedius** Kinnear. RED-HEADED TROGON.

*Pyrotrogon erythrocephalus intermedius* Kinnear, Bull. Brit. Orn. Cl., 45, p. 105, 1925—Bao Ha, Tonkin.

TONKIN: Chapa, one ♂, one ♀, Feb. 12, 15; Muong Mo, three ♂ ♂, March 15 to 17.

LAOS: Phong Saly, two ♀ ♀, April 25, 30; Muong Yo, one ♂, three ♀ ♀, May 14 to 18.

This seems to be a very slight form, recognizable by its somewhat darker back and finer white bars on the wing coverts.

**Carcineutes pulchellus amabilis** Hume. PEGU BANDED KINGFISHER.

*Carcineutes amabilis* Hume, Stray Feathers, 1, p. 474, 1873—Pegu Hills.

LAOS: Vientiane, one ♂, one ♀, June 30, July 1.

This forest Kingfisher had not been recorded before so far north in Indo-China.

**Halcyon smyrnensis fusca** (Boddaert). INDIAN WHITE-BREASTED KINGFISHER.

*Alcedo fusca* Boddaert, Pl. Enl., p. 54, 1783—Malabar.

TONKIN: Bac Tan Trai, one ♂, Feb. 26; Lai Chau, one ♀, April 1; Muong Mo, three ♂♂, one ♀, March 15 to 19; Muong Boum, one ♂, March 26.

LAOS: Muong Yo, one ♀, May 12; Boun Tai, three ♂♂, May 22 to 29.

***Pelargopsis capensis burmanica* Sharpe. BURMESE STORK-BILLED KINGFISHER.**

*Pelargopsis burmanica* Sharpe, P. Z. S. Lond., 1870, p. 67—Burma.

LAOS: Boun Tai, one ♂, May 25; Muong Khoua (Nam Hou River), one ♀, June 7; Nam Hou River below Muong Ngoi, one ♂, June 10.

As pointed out by Hartert (Novit. Zool., 31, p. 129, 1924) Gloger's description of *Pelargopsis* is perfectly recognizable and Oberholser's substitution of *Ramphalcyon* is unnecessary.

The species has not been found before so far north in Indo-China.

***Ceyx tridactylus tridactylus* (Pallas). INDIAN THREE-TOED KINGFISHER.**

*Alcedo tridactylus* Pallas, Spic. Zool., 6, p. 10, 1769—Assam.

LAOS: Muong Yo, one ♂, May 12.

Bill Scarlet, feet Mars Orange.

This beautiful little Kingfisher was also seen on June 2 in the forest between Boun Tai and Kouei Soung. It has apparently not been found before in northern Indo-China.

***Alcedo hercules* Laubmann. BLYTH'S KINGFISHER.**

*Alcedo hercules* Laubmann, Verhand. der Orn. Gesell. in Bayern, 12, 1, p. 238, 1917—Sikkim.

TONKIN: Muong Mo, one ♂ (wing 98), March 17.

LAOS: Muong Yo, one ♂ (wing 102), May 19.

This Kingfisher was seen by Stevens at Bao Ha, Tonkin (Kinnear, 1929, p. 121), but has not been collected before in Indo-China.

***Alcedo atthis bengalensis* Gmelin. COMMON INDIAN KINGFISHER.**

*Alcedo bengalensis* Gmelin, Syst. Nat., 1, 1766, p. 450—Bengal.

TONKIN: Bai d'Along, one ♀, Feb. 6; Phong Tho, one ♂, Feb. 25; Lai Chau, two ♂♂, March 3, April 1; Muong Moun, three ♂♂, one ♀, March 18 to 27; Ba Nam Nhung, two ♀♀, March 11; Muong Mo, two ♂♂, five ♀♀, March 12 to 19; Muong Boum, two ♂♂, two ♀♀, March 25 to 28.

LAOS: Nam Hou River below Muong Ngoi, one ♂, June 10.

***Ceryle lugubris guttulata* Stejneger. HIMALAYAN PIED KINGFISHER.**

*Ceryle guttulata* Stejneger, Proc. U. S. Nat. Mus., 15, p. 294, 1893—Cachar, India.



TONKIN: Phong Tho (10 km. east of), one ♀, Feb. 22; Bac Tan Trai, two ♀ ♀, Feb. 26, 27; Lai Chau, one ♂, March 3; Muong Moun, one ♂, April 4; Muong Mo, one ♀, March 12; Muong Boum, one adult ♂, three unsexed juvenals, March 23.

**Ceryle rudis leucomelanura** Reichenbach. INDIAN PIED KING-FISHER.

*Ceryle leucomelanura* Reichenbach, Handb., Alced., p. 21, 1851—Ceylon.

TONKIN: Lai Chau, two ♂ ♂ (culmen 63, 65), April 1.

Specimens from south China have been called *insignis*, a large-billed form described by Hartert (Novit. Zool., 17, p. 216, 1910) from Hainan, but our two specimens and nine from south China have bills exactly like two specimens we have examined from India (Kooloo Valley).

**Nyctiornis athertoni** (Jardin and Selby). BLUE-BEARDED BEE EATER.

*Merops athertoni* Jardin and Selby, Ill. Orn., 2, pl. 58, 1829—India.

TONKIN: Muong Moun, one ♂, one ♀, March 30, April 1; Muong Boum, one ♂, one ♀, March 22, 24.

LAOS: Muong Yo, one adult ♂, one juvenal ♂, May 14.

The stomachs of the two collected at Muong Moun were filled with large bees.

**Melittophagus erythrocephalus erythrocephalus** (Gmelin). CHESTNUT-HEADED BEE EATER.

*Merops erythrocephalus* Gmelin, Syst. Nat., 1, 1788, p. 463—India.

TONKIN: Lai Chau, one ♂, March 5; Ba Nam Nhung, two ♀ ♀, March 11; Muong Mo, two ♂ ♂, one ♀, March 12 to 19.

LAOS: Boun Tai, nine ♂ ♂, three ♀ ♀, one unsexed, May 22 to 31; Hatsa, one ♂, one ♀, May 17 (Hendee).

**Eurystomus orientalis orientalis** (Linnaeus). BROAD-BILLED ROLLER.

*Coracias orientalis* Linnaeus, Syst. Nat., 1766, 1, p. 159—India (Java by subsequent designation), Stresemann.

TONKIN: Lai Chau, one ♀, April 1; Muong Mo, five ♂ ♂, two ♀ ♀, March 15 to 19; Muong Boum, two ♂ ♂, two ♀ ♀, March 23 to 28.

**Coracias benghalensis affinis** McClelland. BURMESE ROLLER.

*Coracias affinis* McClelland, P. Z. S. Lond., 1839, p. 164—Assam.

TONKIN: Lai Chau, one ♀, Feb. 28.

LAOS: Boun Tai, one ♀, May 31; Vientiane, one ♂, July 3.

***Upupa epops longirostris* Jerdon. BURMESE HOPOE.**

*Upupa longirostris* Jerdon, Birds of India, 1, p. 393, 1862—Burma.

LAOS: Boun Tai, one adult ♂, one immature ♂, two adult ♀ ♀, May 24 to 31.

Our adult specimens have wings measuring 134, 133, 138, 135 but show great variation in color (culmen from base of forehead 66, 60.5, 60). We follow Baker and Delacour in using the name *longirostris* for the Hoopoes of this region but we do not attach much value to the identification. The species is badly in need of revision.

***Ptilolaemus tickelli indochinensis* Delacour and Jabouille.  
TICKELL'S HORNBILL.**

*Ptilolaemus tickelli indochinensis* Delacour and Jabouille, Bull. Brit. Orn. Cl., 48, p. 129—Khebon, n. Annam.

TONKIN: Muong Moun, one adult ♂, March 18.

LAOS: Muong Yo, three adult ♂ ♂, May 11 to 18.

Iris Kaiser Brown, orbital skin about Pale Russian Blue, base of mandible Deep Chrome, feet Olive Gray.

The stomachs examined contained fruit and insects.

We use the name *indochinensis* but we have for comparison only a single specimen of *austeni* from Upper Assam. Our three Laotian birds are exactly like the specimen of *austeni* except that all have the central tail feathers indistinctly and irregularly tipped with white. Our Tonkin specimen, however, has no white on the central tail feathers but has a much whiter throat.

***Aceros nepalensis* (Hodgson). RUFOUS-NECKED HORNBILL.**

*Buceros nepalensis* Hodgson, As. Res., 18, p. 178, 1829—Nepal.

TONKIN: Muong Moun, one adult ♂, April 1.

Length (in the flesh) 110 cm., wing spread 136 cm.

Iris Morocco Red, orbital skin Calamine Blue, malar region Dull Violaceous Blue to black, throat Flame Scarlet to Light Vinaceous Cinnamon (on the sides), tip of bill Marguerite Yellow, base of maxilla Deep Olive Buff, base of mandible about Olive Ocher, feet black.

This specimen secured by Wheeler was the only one seen and is the second record for Indo-China. Its stomach contents consisted of fruit.

***Anthracosceros malabaricus leucogaster* (Blyth). BURMESE PIED  
HORNBILL.**

*Buceros leucogaster* Blyth, Journ. As. Soc. Bengal, 10, p. 922, 1841—Tenasserim.

TONKIN: Muong Moun, one ♀, March 19; Nam Nen, one ♂, April 6; Muong Boun, one ♂, March 25.

LAOS: Muong Yo, two ♀ ♀, May 12, 20; Nam Hou River below Ban Ten Khen, one ♂, June 11; Vientiane, one ♂, July 3.

Iris Mikado Brown.

Wing: ♂ ♂ 288, 285, 255; ♀ ♀ 270, 270.

The Pied Hornbills collected had eaten only large fruits.

**Dichoceros bicornis** (Linnaeus). GREAT HORNBILL.

*Buceros bicornis* Linnaeus, Syst. Nat., 1758, 1, p. 104—China.

TONKIN: Muong Moun, one adult ♂, March 11.

Iris Scarlet-Red, maxilla and casque Cadmium Yellow, anterior part of casque Ecru Olive, mandible Marguerite Yellow, tip of bill Grenadine Red, feet Grayish Olive.

Length (in the flesh) 135 cm., wing spread 162 cm.

The stomach contents of this Hornbill consisted of fruit and a few small snails and beetles.

**Cyanops franklinii franklinii** (Blyth). GOLDEN-THROATED BARBET.

*Bucco franklinii* Blyth, Journ. As. Soc. Bengal, 11, p. 167, 1842—Darjeeling.

TONKIN: Chapa, one ♀, Feb. 15; Muong Moun, one ♀, March 29; Lieng San, one ♀, April 5.

We have compared our specimens with six from Loukouchai and one from Darjeeling but we cannot see in ours the characters ascribed by Delacour to the form *tonkinensis* (Bull. Brit. Orn. Cl., 47, p. 153, 1927) from Tam Dao, Tonkin. We understand that Delacour himself no longer maintains this subspecies.

**Cyanops haemacephala indica** (Latham). BURMESE CRIMSON-BREASTED BARBET.

*Bucco indicus* Latham, Ind. Orn., 1, p. 205, 1790—Calcutta.

LAOS: Boun Tai, six adult ♂ ♂, three juvenal ♂ ♂, three adult ♀ ♀, two juvenal ♀ ♀, May 22 to 31; Vientiane, two adult ♂ ♂, one juvenal ♂, one adult ♀, one juvenal ♀, July 1 to 3.

**Cyanops duvaucellii cyanotis** (Blyth). INDIAN BLUE-EARED BARBET.

*Bucco cyanotis* Blyth, Journ. As. Soc. Bengal, 16, p. 487, 1847—Arakan.

TONKIN: Muong Moun, one ♂ (wing 84), March 21.

LAOS: Muong Yo, one adult ♂ (wing 84), two juvenal ♂ ♂, one adult ♀ (wing 82), May 10 to 19; Boun Tai, one ♂ (wing 86), one ♀ (wing 83), May 22 to 29; Vientiane, one juvenal ♀, July 1.

Baker (Ibis, 1919, p. 217) has reviewed the races of this Barbet and shows that *orientalis* Robinson can not be maintained.

**Cyanops asiatica davisoni** (Hume). DAVISON'S BLUE-THROATED BARBET.

*Megalaema davisoni* Hume, Stray Feathers, 5, p. 108, 1877—Meetan, South Tenasserim.

TONKIN: Phong Tho, five ♂♂, three ♀♀, Feb. 22 to 25; Bac Tan Trai, one ♀, Feb. 26; Pa Ham, one ♂, one ♀, March 8, April 6; Muong Moun, eight ♂♂, seven ♀♀, March 12 to April 3; Ba Nam Nhung, one ♀, March 9; Muong Mo, five ♂♂, seven ♀♀, March 13 to 15; Muong Boum, one ♀, March 27.

LAOS: Phong Saly, three ♀♀, April 25 to 28; Muong Yo, four ♂♂, two ♀♀, May 9 to 17; Boun Tai, two ♂♂, five ♀♀, May 22 to 29.

The Blue-throated Barbet proved to be by far the most common Barbet throughout the region traversed in northern Laos and Tonkin.

We agree with Kinnear (1929, p. 127) that *laurentii* Wells can not be recognized.

**Thereiceryx lineatus intermedius** Baker. BURMESE LINEATED BARBET.

*Thereiceryx lineatus intermedius* Baker, Bull. Brit. Orn. Cl., 39, p. 19, 1918—Pahpoon, Burma.

LAOS: Vientiane, one ♂ (wing 123, worn), one ♀ (wing 121), July 2, 3.

Iris Mars Brown, orbital skin Primuline Yellow, feet Light Cadmium (♂).

**Thereiceryx faiostrictus faiostrictus** (Temminck). TEMMINCK'S BARBET.

*Bucco faiostrictus* Temminck, Pl. Col., 3, p. 527, 1831—Cochin China.

LAOS: Vientiane, two ♂♂ (wing 108, worn, 115), June 30, July 2.

**Megalaima virens virens** (Boddaert). GREAT CHINESE BARBET.

*Bucco virens* Boddaert, Tabl. Pl. Enl., p. 53, 1783—China.

TONKIN: Chapa, one ♂, Feb. 13; Pa Ham, two ♀♀, March 8.

LAOS: Phong Saly, two ♀♀, April 29, May 4.

Bill Deep Olive Buff to Light Cadmium at base, feet and tarsi Dark Olive Buff, soles Yellow Ocher (Chapa ♂).

**Sasia ochracea reichenowi** Hesse. BURMESE RUFOUS PICULET.

*Sasia ochracea reichenowi* Hesse, Orn. Monatsb., 19, p. 181, 1911—Burma.

TONKIN: Chapa, one ♀, Feb. 14; Phong Tho, one ♀, Feb. 24; Muong Moun, one ♂, April 1; Ba Nam Nhung, one ♂, March 10.

LAOS: Phong Saly, one ♂, one unsexed, April 25; Boun Tai, one ♀, May 24.  
Iris Carmine, orbital skin Acajou Red, feet Tawny (♀, Chapa).

**Picumnus innominatus malayorum** Hartert. MALAY SPECKLED  
PICULET.

*Picumnus innominatus malayorum* Hartert, Vog. Pal. Faun., 2, pt. 1, p. 937,  
1912—Gunong Ijau, Perak.

TONKIN: Muong Moun, two ♀♀, March 28, April 3; Muong Boum, one ♀,  
March 24; Lai Chau, one ♂, April 1.

LAOS: Phong Saly, two ♂♂, two ♀♀, April 25 to 30; Boun Tai, one ♂,  
May 25.

**Mulleripicus pulverulentus harterti** Hesse. INDIAN GREAT  
SLATY WOODPECKER.

*Mulleripicus pulverulentus harterti* Hesse, Orn. Monatsb., 19, p. 182, 1911—  
Assam.

LAOS: Muong Yo, one ♂, one ♀, May 19, 20.

The male of these two breeding birds has the throat, especially  
the lower throat, strongly washed with red.

Their stomachs contained great numbers of ants.

**Chrysocolaptes lucidus guttacristatus** (Tickell). TICKELL'S  
GOLDEN-BACKED WOODPECKER.

*Picus guttacristatus* Tickell, Journ. As. Soc. Bengal, 2, p. 578, 1833—Borabhum,  
Bengal.

TONKIN: Muong Mo, one ♂, March 17; Muong Boum, one ♂, March 22.

LAOS: Vientiane, two ♂♂, two ♀♀, June 30 to July 2.

**Dinopium javanense intermedium** (Blyth). BURMESE GOLDEN-  
BACKED THREE-TOED WOODPECKER.

*Picus intermedius* Blyth, Journ. As. Soc. Bengal, 14, 1845, p. 193—Arakan.

TONKIN: Lai Chau, one ♂, two ♀♀, March 3, 4.

LAOS: Vientiane, one ♂, June 30.

**Micropternus brachyurus annamensis** Delacour and Jabouille.  
ANNAMESE RUFOUS WOODPECKER.

*Micropternus brachyurus annamensis* Delacour and Jabouille, Bull. Brit. Orn.  
Cl., 45, p. 31, 1924—Hailang, Annam.

TONKIN: Muong Moun, one ♀, March 20.

LAOS: Phong Saly, one ♂, May 1; Muong Yo, one ♂, four ♀♀, May 10 to  
19; Boun Tai, one ♂, three ♀♀, one unsexed, May 24 to 29.

Wing: Laos ♂♂ 120, 120, 120; ♀♀ 120, 119, 119.5, 119.

This distinct form is well characterized by Delacour and Jabouille as differing "from *M. b. fokiensis* (Swinhoe) in its smaller size, more barred wings and tail, much darker head, more barred but lighter body, while the rufous collar on the hind neck is of a brighter rufous."

All stomachs examined contained only ants.

***Micropternus brachyurus phaiiceps* Blyth. NORTHERN RUFOUS WOODPECKER.**

*Micropternus phaiiceps* Blyth, Journ. As. Soc. Bengal, 14, p. 195, 1845—Arakan.

LAOS: Vientiane, one ♀ (wing 122), July 2.

This bird is separable from specimens of *williamsoni* from Bangkok by the pale streaks on the throat which are concolor with the breast. From *annamensis* it differs sharply in being much paler, with the stripes much paler.

***Blythipicus pyrrhotis annamensis* Kinnear. RED-EARED BAY WOODPECKER.**

*Blythipicus pyrrhotis annamensis* Kinnear, Bull. Brit. Orn. Cl., 46, p. 72, 1926—Langbian Peaks, s. Annam.

TONKIN: Ba Nam Nhung, one immature ♂, March 9; Muong Mo, one ♂, March 17; Muong Boum, one ♂, March 27.

LAOS: Phong Saly, one ♂, May 2; Boun Tai, one immature ♂, May 29.

Wing: ♂ ♂ 144, 146, 147, 153.

We have examined the British Museum series with Kinnear and Delacour and have concluded with them that *intermedius* Delacour (Bull. Brit. Orn. Cl., 47, p. 154) can not be recognized. Compared with nine skins of *sinensis* from Fukien in the Museum of Comparative Zoology our series differs markedly in being much more red, less brown, above and in having the tail much less heavily barred with black. The nuchal patch in all of our skins is continuous across the nape.

***Dryobates semicoronatus obscurus* La Touche. YUNNAN PIGMY WOODPECKER.**

*Dryobates pygmaeus obscurus* La Touche, Bull. Brit. Orn. Cl., 42, p. 14, 1921—Hokow, Yunnan.

TONKIN: Pou Den Dinh, one ♂ (wing 90), one ♀ (wing 91), April 18.

Our specimens are very similar to the type of *obscurus* with which we have compared them. This form is separable from *omissus* Rothschild by its much smaller size.

**Dryobates semicoronatus canicapillus** (Blyth). BURMESE PYGMY WOODPECKER.

*Picus canicapillus* Blyth, Journ. As. Soc. Bengal, 14, p. 197, 1845—Arakan.  
LAOS: Vientiane, three ♂♂, one ♀, July 1 to 3.

**Gecinulus grantia indochinensis** Delacour. PALE-HEADED WOODPECKER.

*Gecinulus grantia indochinensis* Delacour, Bull. Brit. Orn. Cl., 47, p. 154, 1927—  
Backan, n. e. Tonkin.

TONKIN: Pa Ham, one ♀, March 8; Muong Moun, three ♂♂, one ♀, March  
18 to 30; Muong Mo, one ♂, March 16.

LAOS: Phong Saly, one ♂, April 29.

Wing: Tonkin ♂♂ 129, 133, 133, 134; ♀♀ 129, 135. Laos  
♂ 134.

This well marked form differs from typical *grantia*, of which we have seen one example from Upper Assam, in its larger size and much darker and richer colored head. From *viridanus* (seven Fukien skins examined) it differs in having the back and wing coverts much more red and the head of a richer color above.

**Chrysophlegma flavinucha annamensis** Delacour and Jabouille.  
LARGE YELLOW-NAPED WOODPECKER.

*Chrysophlegma flavinucha annamensis* Delacour and Jabouille, Bull. Brit. Orn.  
Cl., 48, p. 130, 1928—Kebon, n. Annam.

TONKIN: Muong Mo, one ♂, March 13.

LAOS: Muong Yo, one adult ♂, one immature ♂, one immature ♀, May 10  
to 17; Boun Tai, one ♂, one ♀, May 26.

Our Tonkin specimen is like our other skins and not like *styani* which Delacour (Bull. Brit. Orn. Cl., 48, p. 130) ascribes to Tonkin.

**Picus chlorolophus laotianus** Delacour. LAOTIAN SMALL YELLOW-NAPED WOODPECKER.

*Picus chlorolophus laotianus* Delacour, Bull. Brit. Orn. Cl., 47, p. 12, 1926—  
Xieng Kouang, Laos.

TONKIN: Chapa, one ♀ (wing 137), Feb. 13.

We are now informed by Delacour that *harmandi* (Bull. Brit. Orn. Cl., 47, p. 170) is a synonym of *laotianus*.

**Picus chlorolophus burmae** Meinertzhagen. BURMESE SMALL YELLOW-NAPED WOODPECKER.

*Picus chlorolophus burmae* Meinertzhagen, Bull. Brit. Orn. Cl., 44, p. 54, 1924—  
Pegu Town.

LAOS: Muong Yo, two ♂♂, two ♀♀, May 13 to 20; Boun Tai, one ♀, May 30.  
Wing: 133, 131, 133, 128, 133.

We have confirmed the identification of both races of *Picus chlorolophus* by comparison with the British Museum series. This subspecies has not been collected previously in Indo-China.

***Picus canus hessei* Gyldenstolpe. BURMESE BLACK-NAPED GREEN WOODPECKER.**

*Picus canus hessei* Gyldenstolpe, Orn. Monatsb., 24, p. 28, 1916—Pak Koh, n. Siam.

TONKIN: Muong Moun, six ♂♂, three ♀♀, March 13 to April 2; Ba Nam Nhung, three ♂♂, March 8 to 10; Muong Mo, two ♂♂, March 16, 17; Muong Boum, two ♂♂, one ♀, March 23 to 27.

LAOS: Vientiane, one juvenal ♂, July 1.

Iris Vandyke Red (♂ Muong Moun).

Wing: thirteen adult ♂♂ 142–149 (146.6); four ♀♀ 148–149.

Our series is quite uniform. We refer them to *hessei* although their wings have a strong bronze-yellow coloring. Baker has reviewed the races of this species (Ibis, 1919, p. 181).

***Psarisomus dalhousiae* (Jameson). LONG-TAILED BROADBILL.**

*Eurylaimus dalhousiae* Jameson, Edinb. New Phys. Journ., 18, p. 589, 1839—n. India.

TONKIN: Pa Ham, one ♂, one ♀, March 8; Muong Moun, three ♂♂, five ♀♀, March 18 to April 3.

LAOS: Phong Saly, three ♂♂, two ♀♀, April 25 to May 3; Muong Yo, one ♂, three ♀♀, May 15 to 20; Boun Tai, two ♂♂, one ♀, May 22 to 30.

Maxilla Apple Green, mandible Capucine Yellow, tip of bill Lumiere Blue (♂ Pa Ham)

Wing: Tonkin ♂♂ 103, 100, 101, 102; ♀♀ 99, 100, 101, 101, 101, 106. Laos ♂♂ 104, 100, 103, 107, 104, 102; ♀♀ 101, 103, 104, 103, 101, 100.

***Serilophus lunatus elisabethae* La Touche. GOULD'S BROADBILL.**

*Serilophus lunatus elisabethae* La Touche, Bull. Brit. Orn. Cl., 42, p. 14, 1921—Hokow, Yunnan.

TONKIN: Muong Mo, one ♂, March 16.

LAOS: Muong Yo, two ♂♂, two ♀♀, May 12 to 19.

***Corydon sumatranus sumatranus* (Raffles). DUSKY BROADBILL.**

*Coracias sumatranus* Raffles, Trans. Linn. Soc. Lond., 13, p. 303, 1822—Sumatra.

LAOS: Vientiane, one ♂, July 3.



**Eurylaimus javanicus harterti** Van Ort. HARTERT'S BROADBILL.

*Eurylaimus javanicus harterti* Van Ort, Notes Leyden Mus., 31, p. 209, 1909—  
Deli, n. Sumatra.

LAOS: Vientiane, one ♀, July 2.

Iris Light Violet Blue, bill Light Methyl Blue to light Cendre Green on edges, feet Endive Blue.

**Pitta cucullata cucullata** Hartlaub. GREEN-BREASTED PITTA.

*Pitta cucullata* Hartlaub, Rev. Zool., 1843, p. 65—Malacca.

LAOS: Boun Tai, two ♂♂, May 24, 27.

The Green-breasted Pitta has not been found before in Indo-China.

**Pitta moluccensis** (Müller). LESSER BLUE-WINGED PITTA.

*Turdus moluccensis* Muller, Natursyst. Suppl., p. 144, 1776—Moluccas =  
Tenasserim.

LAOS: Boun Tai, one ♂, one ♀, May 29, 31; Vientiane, two ♂♂, two ♀♀,  
June 30 to July 3.

Iris Warm Sepia.

This Pitta has apparently not been taken before in northern Indo-China.

**Pitta oatesi castaneiceps** Delacour and Jabouille. FULVOUS PITTA.

*Pitta oatesi castaneiceps* Delacour and Jabouille, L'Oiseau, 11, No. 7, p. 405,  
July, 1930—Chapa, Tonkin.

TONKIN: Lieng San, four ♂♂, April 6, 7.

Our specimens have been compared with Delacour's series of this very distinct new form.

**Pitta soror tonkinensis** Delacour. TONKINESE BLUE-RUMPED PITTA.

*Pitta douglasi tonkinensis* Delacour, Bull. Brit. Orn. Cl., 47, p. 155, 1927—  
Backan, Tonkin.

TONKIN: Muong Moun, three ♂♂, two ♀♀, March 13 to 19.

Iris Sepia, bill Drab, feet Orange-Cinnamon (adult ♂).

Wing: ♂♂ 124, 127, 123; ♀♀ 122, 122.

As in the case of *Pitta nepalensis* there seem to be two types of plumage—those with a gray face and breast and those suffused with pink. The difference is not sexual. Of this series one male and one female are pink.

***Pitta soror intermedia* Delacour. INTERMEDIATE BLUE-RUMPED PITTA.**

*Pitta soror intermedia* Delacour, Bull. Brit. Orn. Cl., 49, p. 49, 1928—Phuqui, n. Annam.

TONKIN: Muong Moun, two ♂♂ (wing 118, 117), March 18, 21.

This subspecies is very close to *tonkinensis* but seems to be separable by its somewhat smaller size and bluer occiput and nape. Delacour has recently published (Ibis, 1929, p. 404, and L'Oiseau, 10, No. 3, March, 1929, p. 117) an account of this difficult group.

***Pitta nepalensis hendeei* subsp. nov. BLUE-NAPED PITTA.**

*Type* from Muong Moun, Tonkin. No. 74058 Field Museum of Natural History. Adult male. Collected March 19, 1929, by J. Van Tyne. Original No. 761.

*Characters*.—Like *Pitta nepalensis nepalensis* (Hodgson) of India (type locality Nepal) but decidedly smaller. Wing 107 to 114 mm. as compared with 116 to 129 in typical *nepalensis*.

*Material examined*:

*Pitta nepalensis nepalensis*—India: thirty-four ♂♂ (including the type), thirty-two ♀♀.

*Pitta nepalensis hendeei*—northern Indo-China: eighteen ♂♂, twelve ♀♀.

*Specimens collected by the Kelley-Roosevelts Expedition*:

TONKIN: Phong Tho, one ♂, Feb. 24; Lai Chau, one ♂, March 4; Muong Moun, thirteen ♂♂, eleven ♀♀, March 12 to April 2; Muong Mo, one ♀, March 15; Muong Boum, one ♂, March 28.

LAOS: Boun Tai, one ♂, May 22.

Of the specimens of *Pitta n. nepalensis* used in this study, forty-five are in the British Museum and twenty in the Rothschild Museum at Tring, at which institutions the junior author examined and measured them. In the British Museum are two specimens of *hendeei* collected by Delacour at Backan, Tonkin, but all other specimens examined of the new form were collected by the Kelley-Roosevelts Expedition.

The subspecies is named for Russell W. Hendee, member of the expedition and a bird collector of very unusual ability.

Wing: Muong Moun ♂♂ 109, 109, 110, 110, 110, 112, 112, 112, 113, 113, 113, 114, 114; ♀♀ 107, 108, 108, 108, 109, 110, 110, 112, 112, 113, 113.

Our series shows considerable variation in the color of the throat and face, as do other species of *Pitta*. In some specimens that area is strongly suffused with pink, while in others it is gray. This is not correlated with sex and we consider that it is probably in the nature of a color phase, although some believe that it may be explained by age.

The meat of this *Pitta* is delicious and the birds were much sought by the natives of Muong Moun who trapped them in ingenious bamboo live traps baited with live crickets or frogs and set along the *Pitta* runways. It was through the aid of the natives that most of our specimens were secured.

***Anthocincla phayrei obscura* (Delacour) PHAYRE'S PITTA**  
(Plate II)

*Anthocincla phayrei obscura* Delacour Bull Brit Orn Cl 47 p 155, 1927—  
Lakes Babe n e Tonkin

TONKIN Muong Moun, two ♂♂, two ♀♀, March 15 to 18

Wing ♂♂ 104, 101, ♀♀ 103, 102

This distinct form was described from the female only. Our two males differ from a Tenasserim male as already described for the female. They are decidedly darker brown, especially on the back.

***Hirundo daurica striolata* Temminck and Schlegel CHINESE**  
STRIATED SWALLOW

*Hirundo striolata* Temminck and Schlegel, Siebold's Faun Jap Aves, p 33,  
1847—Java

TONKIN Phong Tho, one ♂ one ♀, Feb 24 Pa Ham, one ♂, one ? April 7  
Muong Moun, one ♂ one ♀, March 13 27, Muong Mo, two ♂♂, March  
13 14

LAOS Phong Saly one ♂ April 24, Nam Hou River below Muong Ngoi, one  
♂, June 10

Wing Tonkin, 122 (very worn), 126, 127, 127, 128, 135

***Hirundo daurica nepalensis* Hodgson HODGSON'S STRIATED**  
SWALLOW

*Hirundo nepalensis* Hodgson, Journ As Soc Bengal, 5, p 780, 1856  
Nepal

TONKIN Muong Moun, one ♂, two ♀♀, March 27 to April 1 Chieng Chan,  
one ♂, April 2

Wing 111 to 117.

***Hirundo smithii filifera* Stephens. INDIAN WIRE-TAILED SWALLOW.**

*Hirundo filifera* Stephens, Gen Zool, 13, pt 2, p 78, 1826—India



PHALARUS PILTA (*Anthracoceros phaeopus*) Male (left) and female



LAOS: Nam Hou River below Ban Ten Khen, one ♂, three ♀ ♀, June 11; Mekong River, below Pak Si, one ♀, June 19.

Wing: 109-112 (worn).

This Swallow has not been found previously in northern Indo-China.

**Hirundo rustica gutturalis** Scopoli. EASTERN SWALLOW.

*Hirundo gutturalis* Scopoli, Del. Flor. et Faun. Insubr., 2, p. 93, 1786—New Guinea.

TONKIN: Lao Kay, one ♂, Feb. 18; Muong Moun, one ♂, March 13; Ba Nam Nhung, two ♀ ♀, March 9, 10; Muong Boum, five ♂ ♂, two ♀ ♀, March 22 to 28; Lieng San, one ♂, one ♀, April 4; Mao Xao Phing, one ♂, one ♀, April 9.

LAOS: Phong Saly, two ♂ ♂, three ♀ ♀, April 24 to May 4; Muong Yo, one ♀, May 17; Boun Tai, two ♂ ♂, four ♀ ♀, May 22 to 30; Nam Hou River below Ban Ten Khen, one ♀, June 11.

**Riparia concolor** (Sykes). DUSKY CRAG MARTIN.

*Hirundo concolor* Sykes, P. Z. S. Lond., 1832, p. 83—Deccan.

TONKIN: Pou Den Dinh (at 4,000 ft.), one ♀, April 19.

LAOS: Pak Hou, three ♂ ♂, four ♀ ♀, June 12.

Wing: 114, 113, 105, 112, 112, 104, 108, 110.

The Crag Martin was common about the cliffs above Pou Den Dinh and the great cliff at the mouth of the Nam Hou River although it has not been recorded before from Indo-China.

**Riparia chinensis** (Gray). INDIAN SAND MARTIN.

*Hirundo chinensis* Gray, in Hardw. Ill. Ind. Orn., 1, pl. 35, fig. 3, 1830—32—China.

TONKIN: Bac Tan Trai, one ♂, one ♀, Feb. 26; Muong Mo, one juvenal ♂, March 19.

LAOS: Muong Yo, one ♀, May 18.

The Sand Martin was common both at Bac Tan Trai and at Muong Yo but proved difficult to secure.

**Graucalus macei siamensis** Baker. SIAMESE LARGE CUCKOO SHRIKE.

*Graucalus macei siamensis* Baker, Bull. Brit. Orn. Cl., 38, p. 69, 1918—Mi-Nam Kabum, Siam.

TONKIN: Muong Mo, one ♂ (wing 179), March 18.

LAOS: Phong Saly, one ♀ (wing 176), April 24; Vientiane, one ♂ (wing 161), July 1.

Our specimens are similar to a pair from Koon Tan, northern Siam. Delacour (1929, p. 408) has used the name *larvivorus* Hartert for the bird of northern Indo-China but does not say how they differ from his specimens of *siamensis* from Cambodia and Cochin China. We have seen no Hainan birds but, as Robinson and Kloss say (Ibis, 1919, p. 451), Hartert in his original description of *larvivorus* of Hainan (Novit. Zool., 17, p. 227, 1910) implied that it was exactly like *rex-pineti* of Formosa in color but differed in size. The Formosan bird has a black throat which ours do not have.

**Lalage polioptera (Sharpe). SHARPE'S CUCKOO SHRIKE.**

*Campophaga polioptera* Sharpe, Cat. Birds Brit. Mus., 4, p. 69, pl. 2, 1879—Cochin China.

LAOS: Vientiane, two adult ♂♂, one ♀, one immature unsexed, July 2, 3.

Wing: 107, 110, 110, 107. Tail: 94, 91, 96, 92.

Kloss has recently rediscovered this very distinct species (Ibis, 1918, p. 194). His detailed description fits our birds exactly.

**Lalage melaschistos melaschistos (Hodgson). DARK GRAY CUCKOO SHRIKE.**

*Volucrivora melaschistos* Hodgson, Ind. Rev., 1, p. 328, 1837—Nepal.

TONKIN: Muong Moun, one ♀, March 28; Muong Mo, one ♂, March 16.

LAOS: Phong Saly, one ♂, one ♀, April 28, May 1; Boun Tai, one ♂, May 27.

**Pericrocotus peregrinus vividus (Baker). BURMESE SMALL MINIVET.**

*Pericrocotus peregrinus vividus* Baker, Bull. Brit. Orn. Cl., 40, p. 114, 1920—Attaran River, Burma.

LAOS: Vientiane, two ♀♀, July 3.

Our two specimens are in worn plumage but are doubtless referable to this form.

**Pericrocotus roseus roseus (Vieillot). ROSY MINIVET.**

*Muscicapa rosea* Vieillot, Nouv. Dict. d'Hist. Nat., 21, p. 486, 1818—Bengal.

TONKIN: Muong Moun, one ♂, March 25.

LAOS: Lao Fou Tchai, three ♂♂, two ♀♀, April 21.

Stresemann has recently reviewed the races of this species (Mitteil. Zool. Mus. Berlin, 15, p. 643, 1930).

**Pericrocotus solaris griseigularis Gould. GRAY-THROATED MINIVET.**

*Pericrocotus griseigularis* Gould, P. Z. S. Lond., 1862, p. 282—Formosa.

TONKIN: Chapa, four ♂♂, two ♀♀, Feb. 12 to 15.

These four males all have a large amount of orange on the throat but are closely approached in this respect by some Chinese specimens. Four males and four females from Formosa (*griseigularis*), which we have examined, are not separable from a larger series from Fukien (*mandarinus* Stresemann, Journ. f. Orn., 71, p. 363, 1923) and we do not see how the latter race can be maintained.

**Pericrocotus brevirostris ethologus** Bangs and Phillips. CHINESE SHORT-BILLED MINIVET.

*Pericrocotus brevirostris ethologus* Bangs and Phillips, Bull. Mus. Comp. Zool., 58, p. 283, 1914—Hsienshan, Hupeh.

TONKIN: Pa Ham, one ♀, March 8; Muong Moun, one ♂, March 10.

The male we have compared with the type and a series of *ethologus* with which it agrees closely. Doubtless it is only a migrant in Tonkin. The single female we list under the same name although a single specimen can not be satisfactorily identified because of the great variation among females. For the use of the name *ethologus* see Bangs' paper on the types in the Museum of Comparative Zoology (Bull. Mus. Comp. Zool., 70, p. 297). We understand from Delacour that he no longer maintains the validity of his *tonkinensis*.

**Pericrocotus flammeus bakeri** La Touche. ORANGE MINIVET.

*Pericrocotus speciosus bakeri* La Touche, Bull. Brit. Orn. Cl., 42, p. 54, 1922—Loukouchai, Yunnan.

TONKIN: Chapa, one ♂, Feb. 13; Lai Chau, one ♀, March 2; Muong Moun, three ♂♂, three ♀♀, March 11 to 25; Muong Mo, six ♂♂, three ♀♀, March 14 to 19; Pou Den Dinh, one ♂, three ♀♀, April 18.

LAOS: Phong Saly, two ♂♂, one ♀, April 29 to May 2; Muong Yo, three ♂♂, one ♀, May 10 to 14; Boun Tai, one ♂, May 24; Vientiane, one ♂, July 2.

Stresemann (Mitteil. Zool. Mus. Berlin, 15, p. 639, 1930) has revised this species and recognizes La Touche's *bakeri* which was previously doubted by Rothschild.

This is the common Minivet of northern Indo-China.

**Dissemurus paradiseus paradiseus** (Linnaeus). SIAM LARGE RACKET-TAILED DRONGO.

*Cuculus paradiseus* Linnaeus, Syst. Nat., 1776, 1, p. 172—Siam.

LAOS: Vientiane, one ♂ (wing 167, tail 439, one racket missing), June 30.

This specimen has a very short crest.

**Dissemurus paradiseus grandis** (Gould). ASSAM LARGE RACKET-TAILED DRONGO.

*Edolius grandis* Gould, P. Z. S. Lond., 1836, p. 5—Assam.



TONKIN: Pou Den Dinh, one ♂, April 18 (wing 167, tail 395).

LAOS: Muong Yo, two ♂♂ (wing 172, 171; tail 373, 413), May 13, 20; Hatsa, one ♂ (wing 173; tail 459), May 17.

The crests of these specimens vary much but all are rather long. Baker (Novit. Zool., 25, p. 299) has reviewed the races of this species but his account loses much in value because he gives only the maximum tail length.

### **Bhringa remifer** subsp. RACKET-TAILED DRONGO.

TONKIN: Lai Chau, one ♂, March 1.

LAOS: Phong Saly, one ♀, April 29; Muong Yo, one adult ♂, May 15.

The Muong Yo specimen is the only one with an undamaged racket-tail. Compared with a specimen of *tectirostris* from Darjeeling, the tail of the Muong Yo specimen is longer, with longer bare shafts, and equally long but much more narrow racket web. The total length of its tail is 506 mm., proportioned as follows: basal web 121 (our other three specimens measure 126, 132, 122), bare shaft 270, racket web 115 long and 20 wide. The shaft is entirely bare. We are not sure that our specimens can be referred either to the very long tailed *lefoli* (Delacour and Jabouille, Bull. Brit. Orn. Cl., 48, p. 133) or to the shorter tailed *tectirostris* (Nepal, Burma, Yunnan, etc.). We have not seen Baker's *peracensis* (Bull. Brit. Orn. Cl., 39, p. 18) from the Malay Peninsula but according to his description it is something quite distinct from either of these. It seems to come nearest to deSchauensee's recently described *latispatula* (Proc. Acad. Nat. Sci. Phil., 81, p. 475, 1929—Chieng Mai, Siam) except that the rackets are narrower instead of broader than those of *tectirostris*.

### **Chibia hottentotta hottentotta** (Linnaeus). INDIAN HAIR-CRESTED DRONGO.

*Corvus hottentotta* Linnaeus, Syst. Nat., 1766, 1, p. 155—Cap. b. Spei = Sikkim.

TONKIN: Bac Tan Trai, two ♂♂, Feb. 26; Lai Chau, two ♂♂, one ♀, March 1 to 5; Muong Moun, one ♂, three ♀♀, March 10 to April 3; Ba Nam Nhung, four ♂♂, four ♀♀, March 9 to 11; Muong Mo, one ♂, one ♀, March 15, 19; Muong Boum, one ♂, March 28.

LAOS: Muong Yo, three ♂♂, two ♀♀, May 9 to 20; Boun Tai, four ♂♂, five ♀♀, one juvenal ♀ (apparently of this species), May 22 to 28; Vientiane, one ♂, one immature ♀, June 30, July 3.

### **Chaptia aenea aenea** (Vieillot). NORTHERN BRONZED DRONGO.

*Dicrurus aeneus* Vieillot, Nouv. Dict. d'Hist. Nat., 9, p. 586, 1817—Dacca, Bengal.

TONKIN: Phong Tho, one ♂, one ♀, Feb. 24, 25; Muong Moun, one ♂, March 21; Ba Nam Nhung, two ♂♂, March 9, 11; Pou Den Dinh, one ♀, April 18.

LAOS: Vientiane, one ♀, July 3.

Wing: 121, 121, 121, 122, 127, 126, 122.

**Dicrurus leucophaeus hopwoodi** Baker. ASSAM GRAY DRONGO.

*Dicrurus leucophaeus hopwoodi* Baker, Novit. Zool., 25, p. 294, 1918—Dacca.

TONKIN: Chapa, one ♀, Feb. 15; Lai Chau, one ♂, March 4; Muong Moun, one ♂, one ♀, March 14, 21; Ba Nam Nhung, one ♂, March 11.

LAOS: Phong Saly, two ♀♀, April 25, 26; Boun Tai, one ♀, May 25.

Iris Nopal Red.

Wing: Tonkin, 147, 144, 142, 142, 140. Tail: 154, 150, 152, 146, 142. Wing: Laos, 137, 139, 137. Tail: 149, 146, 149.

Baker (Novit. Zool., 25, p. 291, 1918) and more recently Kloss (Journ. Nat. Hist. Siam, 4, p. 51, 1921) have reviewed the forms of this species. But their subspecies are based almost wholly on measurements which overlap widely and probably mean little. We have perhaps two forms represented in the series listed above. The Laos specimens, which were breeding birds, are rather smaller than the migrants collected in Tonkin.

**Dicrurus macrocerus cathoecus** Swinhoe. CHINESE BLACK DRONGO.

*Dicrurus cathoecus* Swinhoe, P. Z. S. Lond., 1871, p. 377—China.

TONKIN: Pa Ham, one ♂, April 8.

LAOS: Muong Yo, five ♂♂, four ♀♀, May 9 to 19; Boun Tai, one ♂, May 26.

The Chinese Black Drongo was common only at Muong Yo where it was breeding.

**Oriolus traillii traillii** (Vigors). MAROON ORIOLE.

*Pastor traillii* Vigors, P. Z. S. Lond., 1831, p. 175.

TONKIN: Phong Tho, one ♂, Feb. 23; Muong Moun, one ♂, March 23; Nong Lum, one ♂, March 20; Muong Mo, five ♂♂, one ♀, March 13 to 19; Muong Boum, six ♂♂, three ♀♀, March 25 to 28.

LAOS: Phong Saly, four ♂♂, six ♀♀, April 24 to May 2.

Iris Light Ochraceous Buff, bill Light Columbia Blue, feet Payne's Gray (adult ♂, Phong Tho).

**Oriolus xanthornus xanthornus** (Linnaeus). INDIAN BLACK-HEADED ORIOLE.

*Coracias xanthornus* Linnaeus, Syst. Nat., 1758, p. 108—"America" = Bengal.

LAOS: Vientiane, two ♂♂, June 30, July 3.

**Oriolus chinensis tenuirostris** Blyth. BURMESE BLACK-NAPED ORIOLE.

*Oriolus tenuirostris* Blyth, Journ. As. Soc. Bengal, 15, 1846, p. 48—c. India. TONKIN: Ba Nam Nhung, one adult ♂, March 8.

**Oriolus chinensis diffusus** Sharpe. INDIAN BLACK-NAPED ORIOLE.

*Oriolus diffusus* Sharpe, Cat. Birds Brit. Mus., 3, p. 197, 1877—Indian Peninsula to China; Tenasserim as far south as Penang.

TONKIN: Muong Moun, one ♀, March 28.

LAOS: Phong Saly, one ♀, April 29; Muong Yo, three ♂♂, three ♀♀, May 9 to 13.

**Dendrocitta frontalis kurodae** Delacour. BLACK-BROWED TREE PIE.

*Dendrocitta frontalis kurodae* Delacour, Bull. Brit. Orn. Cl., 47, p. 165, 1927—Backan, n. e. Tonkin.

TONKIN: Muong Boum, one ♂, two ♀♀, March 22 to 27.

This form is similar to *frontalis* but the back is browner, less reddish, and the rump is chestnut. Two specimens of *frontalis* from Upper Burma and Bengal which we have examined have the back and rump almost uniform in color. The Tonkin form apparently is rather larger. Wing: 134, 138, 128.

**Dendrocitta formosae himalayensis** Blyth. HIMALAYAN TREE PIE.

*Dendrocitta himalayensis* Blyth, Ibis, 1865, p. 45—Himalayas.

TONKIN: Muong Moun, one ♂, one ♀, March 13; Muong Boum, four ♂♂, five ♀♀, March 22 to 28.

LAOS: Phong Saly, two ♂♂, April 28, May 3.

Our series is clearly of this subspecies and cannot be referred to Delacour's *intermedia* (Bull. Brit. Orn. Cl., 47, p. 165, 1927).

**Cissa chinensis chinensis** (Boddaert). GREEN MAGPIE.

*Coracias chinensis* Boddaert, Tabl. Pl. Enl., p. 38, 1783—China.

TONKIN: Chapa, one ♀, Feb. 15; Muong Moun, two ♂♂, one ♀, March 11 to April 1; Muong Mo, two ♂♂, two ♀♀, March 14 to 18.

LAOS: Phong Saly, one ♂, May 1; Muong Yo, one ♂, May 14; Boun Tai, one ♂, May 28.

This Jay proved to be uncommon and very shy and hard to collect.

As is well known, specimens of this species rapidly change their color, the yellow and green becoming entirely white and blue in a few years. Our Laos specimens, which were taken in May, had

already begun to turn blue in life. The crown changes first and later the back and finally the whole plumage. In museum skins the red primaries also fade out after a few years. A 1923 specimen in the Museum of Comparative Zoology, although kept in a dark case, has already become almost wholly blue, but much of the red in primaries still remains.

Delacour has recently published a revision of the species of *Cissa* (L'Oiseau, 10, Jan., 1929, p. 2).

***Urocissa erythrorhyncha erythrorhyncha* (Boddaert). CHINESE BLUE MAGPIE.**

*Corvus erythrorhynchus* Boddaert, Tabl. Pl. Enl. D'Aub., p. 38, 1788—China.

TONKIN: Lai Chau, one ♂, one ♀, Feb. 28; Muong Moun, one ♂, two ♀ ♀, March 10; Ba Nam Nhung, one ♂, March 9; Muong Mo, one ♂, one ♀, March 12, 16; Muong Boum, two ♂ ♂, March 22, 27; Lieng San, two ♂ ♂, April 7, 9.

LAOS: Muong Yo, two ♂ ♂, May 13, 17.

***Pica pica serica* Gould. CHINESE MAGPIE.**

*Pica serica* Gould, P. Z. S. Lond., 1845, p. 2—Amoy.

TONKIN: Phong Tho, two ♂ ♂, one ♀, Feb. 22, 24; Lieng San, one ♂, April 6.

LAOS: Phong Saly, one ♂, April 26.

***Corvus coronoides colonorum* Swinhoe. SOUTHERN CHINESE JUNGLE CROW.**

*Corvus colonorum* Swinhoe, Ibis, 1864, p. 427—Sawo Harbor, Formosa.

TONKIN: Phong Tho, one ♂, Feb. 24; Lai Chau, two ♂ ♂, one ♀, March 4 to April 1; Muong Moun, one ♀, April 4; Ba Nam Nhung, one ♂, March 10.

LAOS: Ban Kana, one ♀, June 7.

Our specimens agree closely with the type of *mengtszensis* La Touche but we do not see that they can be separated from *colonorum*.

***Melanochlora sultanea sultanea* (Hodgson). INDIAN SULTAN TIT.**

*Parus sultaneus* Hodgson, Indian Rev., 1836, p. 31—Nepal.

TONKIN: Muong Mo, two ♂ ♂, one ♀, March 16 to 19.

LAOS: Muong Yo, one ♂, May 10.

Delacour has called Indo-Chinese specimens *seorsa* but none of our specimens are paler below or show any trace of black shafts on the crown feathers.

**Aegithaliscus concinnus talifuensis** Rippon. RIPPON'S RED-HEADED TIT.

*Aegithaliscus talifuensis* Rippon, Bull. Brit. Orn. Cl., 14, p. 18, 1903—Gyi-dzin, n. Shan States.

TONKIN: Chapa, two ♀ ♀, Feb. 14.

**Parus major altarum** La Touche. CHINESE GRAY TIT.

*Parus major altarum* La Touche, Bull. Brit. Orn. Cl., 43, p. 43, 1922—Mengtz, Yunnan.

TONKIN: Muong Boum, one ♂, one ♀, March 24 to 26.

LAOS: Phong Saly, five ♂ ♂, one ♀, April 25 to May 2; Muong Yo, one ♂, two ♀ ♀, May 9 to 16; Boun Tai, one ♂, one ♀, May 28.

Wing: ♂ ♂ 66, 66, 66, 66, 65, 64, 66; ♀ ♀ 64, 64, 65 (all are in rather worn plumage).

We have compared our series with the types and a large series of *altarum* La Touche and consider them to be the same. Delacour recorded (1927, p. 163) *P. major thibetanus* from Xieng Kouang and later (Bull. Brit. Orn. Cl., 47, p. 166) referred them to his *indochinensis* newly described from northeastern Tonkin. But he described *indochinensis* as like *commixtus* Swinhoe in all but size. Since *commixtus* is a gray-backed form and our series is green-backed they can not be the same. The type of *altarum* was in fresh plumage but worn birds from Mengtz occasionally have a wing as short as 66 mm.

**Parus rex** David. YELLOW-CHEEKED TIT.

*Parus rex* David, Ann. Scien. Nat., (5), art. 9, 1874.

TONKIN: Chapa, five ♂ ♂, one ♀, Feb. 11 to 14; Lieng San, two ♂ ♂, two ♀ ♀, April 5 to 7; Mao Xao Phing, one ♂, April 8.

**Sitta frontalis corallina** Hodgson. VELVET-FRONTED NUTHATCH.

*Sitta corallina* Hodgson, Journ. As. Soc. Bengal, 5, 1836, p. 779—Nepal.

LAOS: Phong Saly, one ♂, one ♀, May 1; Muong Yo, one ♀, May 19; Boun Tai, one ♂, May 31; Vientiane, one ♀, July 1.

Bill Brazil Red, iris Lemon Yellow (adult ♂, Boun Tai).

As Bangs has shown (Bull. Am. Mus. Nat. Hist., 44, p. 594) this Nuthatch in Yunnan and Burma differs from typical *frontalis* of Java in having a vinaceous rather than lilaceous tinge below and in having a more extended throat patch.

**Sitta castanea cinnamoventris** Blyth. CINNAMON-BELLIED NUTHATCH.

*Sitta cinnamoventris* Blyth, Journ. As. Soc. Bengal, 11, p. 459, 1842—Darjeeling.



LAOTIAN WILLOW WARBLER (*Phylloscopus pernotus*). Upper figure.

STRIATED BULBUL (*Alcedo striatus*). Lower figure.



TONKIN: Muong Moun, two ♀ ♀, March 30, April 4; Pou Den Dinh, one ♂, April 18.

LAOS: Muong Yo, one ♂, May 15.

***Sitta castanea neglecta* Walden. BURMESE NUTHATCH.**

*Sitta neglecta* Walden, Ann. Mag. Nat. Hist., (4), 5, p. 218, 1870—Karen Hills, Burma.

LAOS: Vientiane, one immature ♀, July 8.

J. H. Riley, who has examined this skin, writes that it is probably *neglecta* although an adult male *neglecta* in the National Museum is darker, especially below. But our specimen, which is largely in the immature plumage, has several new dark feathers of the adult plumage just coming in, and it does have the throat and breast relatively much paler than the belly as is characteristic of *neglecta*.

Stuart Baker (Birds Brit. Ind., 1, p. 127) says "they are found between 2,000 and 5,000 feet, never in the plains." However, this specimen was collected on the plains near Vientiane which has an altitude of less than five hundred feet.

***Minla ignotincta mariae* La Touche. RED-TAILED MINLA.**

*Minla ignotincta mariae* La Touche, Bull. Brit. Orn. Cl., 42, p. 30, 1921—Milati and Loukouchai.

TONKIN: Chapa, four ♂ ♂, three ♀ ♀, Feb. 12 to 14; Lieng San, one ♂, April 7.

We have compared our specimens with the type of *mariae* with which they agree closely.

***Mesia argenteauris rubrogularis* Kinnear. SILVER-EARED MESIA.**

*Mesia argenteauris rubrogularis* Kinnear, Bull. Brit. Orn. Cl., 45, p. 75, 1925—Ngai Tio, Tonkin.

TONKIN: Lieng San, seven ♂ ♂, two ♀ ♀, April 4 to 7; Mao Xao Phing, one ♂, April 8.

LAOS: Phong Saly, eight ♂ ♂, six ♀ ♀, April 25 to May 4.

This species was breeding at Phong Saly.

***Chloropsis hardwickii hardwickii* Jardin and Selby. ORANGE-BELLIED CHLOROPSIS.**

*Chloropsis hardwickii* Jardin and Selby, Ill. Orn. Add., 1829, p. 1—Nepal.

TONKIN: Chapa, four ♂ ♂, one ♀, Feb. 12 to 15; Bac Tan Trai, one ♂, Feb. 26; Lai Chau, one ♂, one ♀, March 5; Muong Moun, one ♂, April 4; Ba Nam Nhung, two ♂ ♂, two ♀ ♀, March 9 to 11; Muong Mo, four ♀ ♀, March 16, 17; Muong Boum, one ♂, one ♀, March 23; Pou Den Dinh, one ♂, April 18.

LAOS: Phong Saly, one ♂, two ♀ ♀, April 25 to 29; Muong Yo, one ♂, May 16.



***Chloropsis aurifrons inornata* Kloss. SIAMESE CHLOROPSIS.**

*Chloropsis aurifrons inornatus* Kloss, Ibis, 1918, p. 198—Lat Bua Kao, Siam.  
LAOS: Vientiane, six ♂♂, one ♀, July 1 to 3.

***Chloropsis cochinchinensis cochinchinensis* (Gmelin). BURMESE CHLOROPSIS.**

*Turdus cochinchinensis* Gmelin, Syst. Nat., 1788, 1, p. 825—Cochin China.

TONKIN: Phong Tho, two ♀♀, Feb. 24; Bac Tan Trai, two ♀♀, Feb. 26; Lai Chau, two ♂♂, one ♀, March 1 to 4; Pa Ham, two ♂♂, April 7, 8; Muong Moun, one ♂, one ♀, March 21, 27; Ba Nam Nhung, two ♂♂, one ♀, March 11; Muong Mo, one ♂, two ♀♀, March 13 to 18; Muong Boum, two ♂♂, March 23, 24.

LAOS: Muong Yo, three ♂♂, one ♀, May 12 to 15; Boun Tai, one ♂, May 31; Vientiane, one ♀, July 2.

Kloss (Journ. Malay. Branch Royal As. Soc., 4, p. 161, 1926) has called attention to the validity of Gmelin's name for the species usually known as *C. chlorocephala*.

***Aethorhynchus lafresnayei lafresnayei* (Hartlaub). GREAT IORA.**

*Iora lafresnayei* Hartlaub, Rev. Zool., 1844, p. 401—Malacca.

TONKIN: Pa Ham, one ♂, one ♀, April 7, 8.

LAOS: Boun Tai, one ♂, one ♀, May 24, 28; Vientiane, one ♀, July 1.

***Aegithina tiphia tiphia* (Linnaeus). COMMON IORA.**

*Motacilla tiphia* Linnaeus, Syst. Nat., 1758, p. 186—Bengal.

LAOS: Pak Si, one ♂ (wing 64), June 18; Vientiane, two ♂♂ (wing 67, 64), three ♀♀ (wing 64, 66, 62), July 1 to 3.

None of our specimens of either race show any black except on the wings, wing coverts, and tail. A male taken June 18 is molting from the olive green tail to the black.

***Aegithina tiphia styani* La Touche. STYAN'S IORA.**

*Aegithina tiphia styani* La Touche, Bull. Brit. Orn. Cl., 43, p. 174, 1923 -- s. Yunnan.

TONKIN: Lai Chau, one ♀, March 6; Muong Moun, one ♂, March 10.

LAOS: Lao Fou Tchai, one ♂, April 21; Boun Tai, three ♂♂, one ♀, May 28, 29.

We have compared our series with the type of *styani*. It is a very distinct form with longer bill, wings, and tail. Delacour records only typical *tiphia* from Indo-China and our southern Laos specimens are of that form. The subspecies *styani* is not only brighter

below but we note that our three adult males have much more green on the tips of the tail feathers.

A fully feathered juvenal was collected May 29 at Boun Tai.

**Pteruthius aeralatus** Tickell x **ricketti** Ogilvie Grant. SHRIKE  
BABBLER.

TONKIN: Chapa, two ♂♂, Feb. 12; Pou Den Dinh, two ♂♂, April 18.

Our specimens are curiously intermediate between *aeralatus* and *ricketti* though they may be considered nearer the former because they have black ear coverts and traces of the white line below the eye. The throat of one is rather light colored, somewhat as in *aeralatus*, but the other three have dark gray throats like *ricketti*. It seems to be a case of an intermediate form too different from both extremes to bear the name of either and yet too variable to be separated under a third name.

**Pteruthius aenobarbus intermedius** (Hume). HUME'S SHRIKE  
BABBLER.

*Allotrius intermedius* Hume, Stray Feathers, 5, p. 112, 1877—Tenasserim.

TONKIN: Chapa, two ♂♂, Feb. 13.

LAOS: Muong Yo, one ♂, May 16.

**Leiothrix lutea lutea** (Scopoli). CHINESE RED-BILLED LEIOTHRIX.

*Sylvia lutea* Scopoli, Del. Flor. et Faun. Insubr., 2, p. 96, 1786—Hills of Anhwei south of the Yangtse, designated by Stresemann, Journ. f. Orn., 71, p. 364.

TONKIN: Chapa, four ♂♂, four ♀♀, two unsexed, Feb. 12 to 14.

Bill Brazil Red, tarsus Ochraceous Tawny, feet Honey Yellow.

This series is uniformly deeply colored but we hesitate to recognize Stresemann's *kwangtungensis* which seems to have no definite range of its own but to be based on brightly colored winter birds (see Bangs and Peters, Bull. Mus. Comp. Zool., 68, p. 344).

**Erpornis xantholeuca xantholeuca** Hodgson. WHITE-BELLIED  
ERPORNIS.

*Erpornis xantholeuca* Hodgson, Journ. As. Soc. Bengal, 13, p. 380, 1844—Nepal.

LAOS: Phong Saly, one ♂, May 2; Muong Yo, one ♂, one ♀, May 19, 20; Mekong River 30 miles above Paklay, one unsexed, June 21.

**Yuhina flavicollis rouxi** (Oustalet). CHESTNUT-NAPED IXULUS.

*Ixulus rouxi* Oustalet, Bull. Mus. d'Hist. Nat., 2, p. 184-86, 1896—Ly-sien Kiang.

TONKIN: Lieng San, six ♂♂, one ♀, April 5 to 7; Muong Moun (mts. west of), one ♂, March 31; Mao Xao Phing, one ♀, April 8.

LAOS: Phong Saly, two ♂♂, April 28, May 1.

***Yuhina nigrimentum intermedia* Rothschild. BLACK-CHINNED YUHINA.**

*Yuhina nigrimentum intermedia* Rothschild, Bull. Brit. Orn. Cl., 43, p. 11, 1922—Mekong = Salween Divide.

LAOS: Muong Yo, one ♂, one ♀, May 14.

Our specimen is an adult and shows more buff below as Rothschild has described.

***Yuhina diademata ampelina* Rippon. RIPPON'S YUHINA.**

*Yuhina ampelina* Rippon, Bull. Brit. Orn. Cl., 11, p. 12, 1900—Warar Bum, 6,000 ft., 30 miles east of Bhamo.

This is a Yunnan species collected for the first time in Indo-China. Delacour and Jabouille (L'Oiseau, 11, July, 1930, p. 403) have separated their three Tonkin specimens under the name of *obscura*. We have compared our pair with a good series from Yunnan and find them indistinguishable.

***Siva cyanuroptera wingatei* Ogilvie Grant. YUNNAN BLUE-WINGED SIVA.**

*Siva wingatei* Ogilvie Grant, Bull. Brit. Orn. Cl., 10, p. 88, 1900—Yunnan City.

TONKIN: Chapa, three ♂♂, four ♀♀, Feb. 12 to 15; Lieng San, five ♂♂, April 5 to 7.

LAOS: Phong Saly, one ♂, two ♀♀, April 24 to May 1.

A female collected at Phong Saly on April 24 contained an egg ready to lay.

***Staphidia torqueola* (Swinhoe). COLLARED STAPHIDIA.**

*Siva torqueola* Swinhoe, Anñ. Mag. Nat. Hist., (4), 5, p. 174, 1870—Tingchow Mts., 100 miles from Amoy.

TONKIN: Pa Ham, one ♀, March 8; Muong Mo, three ♂♂, two ♀♀, March 18, 19.

LAOS: Phong Saly, seven ♂♂, one ♀, April 24 to May 1.

We have compared our series with twelve from Fukien and find that ours have a rather shorter wing and smaller, more slender bill.

Wing: Tonkin ♂♂ 63, 63, 60; ♀♀ 60, 61, 60. Laos ♂♂ 63, 64, 63, 62, 61, 63, 63; ♀ 63. Fukien ♂♂ 66, 65, 66, 68; ♀♀ 66, 68, 67, 66, 64, 63.

However the difference seems too slight to be recognized in nomenclature.

This species is doubtless a resident in northern Indo-China.

***Oligura castaneo-coronata* Burton. CHESTNUT-HEADED SHORT-WING.**

*Sylvia castaneo-coronata* Burton, P. Z. S. Lond., 1835, p. 152.

TONKIN: Chapa, one ♂, Feb. 15; Lieng San, one ♂, April 6.

This species had not been collected previously in Indo-China. Delacour and Jabouille (L'Oiseau, 11, July, 1930, p. 405) have since described the Chapa bird as *abadiei* but we are unable to recognize the characters in our specimens.

***Actinodura ramsayi yunnanensis* Bangs and Phillips. YUNNAN BAR-WING.**

*Actinodura ramsayi yunnanensis* Bangs and Phillips, Bull. Mus. Comp. Zool., 58, p. 288, 1914—Mongtze, Yunnan.

TONKIN: Chapa, one ♂, one ♀, Feb. 13; Lieng San, one ♂, two ♀ ♀, April 6, 7; Mao Xao Phing, one ♂, April 8.

LAOS: Lao Fou Tchai, one ♂, one ♀, April 21; Phong Saly, four ♂ ♂, four ♀ ♀, April 24 to 30.

We have compared this series with the type and twenty-two other specimens of *yunnanensis* from Mongtze and Loukouchai. April specimens are much grayer on the back than winter specimens, but birds taken in the same season appear identical in color. Kinnear's two specimens of *minor* (Bull. Brit. Orn. Cl., 45, p. 74) were taken in June and hence were very gray. The other character of *minor* is said to be its small size, but all of our specimens are as large as those from Yunnan. We therefore consider *minor* to be a synonym of *yunnanensis*.

Wing: Tonkin ♂ ♂ 87, 92; ♀ ♀ 84, 87, 89. Laos ♂ ♂ 89, 89, 89, 90, 91; ♀ ♀ 84, 85, 86, 86, 88.

Delacour (Bull. Brit. Orn. Cl., 47, p. 162, 1927) has described *kinneari* from Tam Dao, Tonkin, comparing it with *minor* of west Tonkin. We fail to see how it differs from *yunnanensis*.

***Leioptila annectens annectens* Blyth. BLYTH'S SIBIA.**

*Leioptila annectens* Blyth, Journ. As. Soc. Bengal, 16, p. 450, 1847—Darjeeling.

TONKIN: Chapa, one ♀, Feb. 15.

LAOS: Phong Saly, one ♂, April 25.

These two specimens appear identical with a single bird from Manipur. We can not recognize *saturata* Walden (Ibis, 1875, p. 352) on the basis of the material before us.

***Leioptila desgodinsi desgodinsi* (David and Oustalet).**

*Sibia desgodinsi* David and Oustalet, Bull. Soc. Philom. Paris, 1, p. 139, 1877—Yer-ka-lo, Mekong River, China.

TONKIN: Chapa, one ♂, one ♀, Feb. 12.

***Sibia picaoides cana* Riley. LONG-TAILED SIBIA.**

*Sibia picaoides cana* Riley, Proc. Biol. Soc. Wash., 42, p. 166, 1929—Doi Angka, Siam.

TONKIN: Chapa, one ♂, one ♀, Feb. 15; Muong Boum, two ♀ ♀, March 21; Nong Lum, March 21.

LAOS: Pyn Ho, one ♀, April 19.

We were immediately impressed with the gray color and short, stout bill of these specimens compared with typical *picaoides* and upon comparison with five specimens of *cana* kindly loaned us by the National Museum we find that they bear out exactly the characters which Riley has ascribed to *cana*.

The Long-tailed Sibia had not been recorded previously from Indo-China.

***Lioparus chrysotis forresti* (Rothschild). GOLDEN-BREASTED FULVETTA.**

*Fulvetta chrysotis forresti* Rothschild, Bull. Brit. Orn. Cl., 46, p. 64, 1926—Shweli = Salween Divide, Yunnan.

TONKIN: Chapa, one ♂, Feb. 11.

***Pseudominla castaneiceps castaneiceps* (Hodgson). CHESTNUT-HEADED BABBLER.**

*Minla castaneiceps* Hodgson, Ind. Rev., p. 38, 1838—Nepal.

Previously found in Indo-China only by Stevens (Kinnear, 1929, p. 300) at Ngai Tio where he took two specimens.

***Schoeniparus rufigularis blanchardi* Delacour and Jabouille. RED-THROATED TIT BABBLER.**

*Schoeniparus rufigularis blanchardi* Delacour and Jabouille, Bull. Brit. Orn. Cl., 48, p. 132, 1928—Phuqui, n. Annam.

TONKIN: Phong Tho, two ♀ ♀, Feb. 24, 25; Muong Moun, two ♂ ♂, one ♀, March 14 to 27; Muong Mo, one ♂, March 16; Muong Boum, one ♂, March 23.

LAOS: Muong Yo, one ♂, May 14; Boun Tai, two ♂ ♂, one ♀, May 24 to 28.

We have sent four specimens of our very uniform series to Mr. Kinnear who writes us that they are all *blanchardi* "which is distinguishable from *major* by the darker colour of the back and rather smaller size." He states that his *stevensi* (Bull. Brit. Orn. Cl., 45, p. 10) "is quite different; the throat is rusty white, breast and belly rusty white mixed with grayish-brown, above darker, the streak above the eye and the lores slightly darker than the throat." He adds that he considers the specimens identified by Delacour as *stevensi*, *major*, and *blanchardi* to be, in fact, all *blanchardi*.

***Alcippornis nepalensis fraterculus* (Rippon). SHAN STATES BABBLER.**

*Alcippe fratercula* Rippon, Bull. Brit. Orn. Cl., 11, p. 11, 1900—Nanoi, Loi Mai, s. Shan States, 5,300 ft.

LAOS: Phong Saly, nine ♂♂, four ♀♀, April 24 to May 2; Muong Yo, two ♀♀, May 17, 20.

A series of our specimens has been compared with the type in the British Museum and was found to agree closely. The form *laotianus* is apparently not recognizable.

Breeding birds were taken at both Phong Saly and Muong Yo.

***Alcippornis nepalensis schaefferi* (La Touche). SCHAEFFER'S BABBLER.**

*Alcippe nipalensis schaefferi* La Touche, Bull. Brit. Orn. Cl., 42, p. 81, 1922—Milati, Yunnan.

TONKIN: Chapa, four ♂♂, four ♀♀, Feb. 11 to 15; Ngai Tio, one ♂, Feb. 20; Lieng San, one ♂, April 7.

Our specimens from Chapa and Ngai Tio have pale brown legs and feet as recorded by Kinnear (1929, p. 297) for his Tonkin specimens. But our Lieng San bird differs sharply from the others in having the legs and bill black. Otherwise it seems to be a typical specimen of *schaefferi*. We have compared our series with the type and the long series in the British Museum.

***Alcippornis poiocephala alearis* Bangs and Van Tyne. TONKINESE QUAKER BABBLER.**

*Alcippornis poiocephala alearis* Bangs and Van Tyne, Field Mus. Nat. Hist., Zool. Ser., 18, No. 1, p. 4, 1930—Muong Moun, Tonkin.

TONKIN: Lai Chau, one ♂, March 4; Pa Ham, one ♂, April 7; Muong Moun, seven ♂♂ (including the type), two ♀♀, March 14 to April 4; Muong Mo, two ♂♂, four ♀♀, March 12 to 19; Muong Boum, four ♂♂, two ♀♀, March 19 to 27.

LAOS: Muong Yo, two ♂♂, two ♀♀, Boun Tai, two ♂♂, May 28 to 31.

This subspecies is most nearly like *Alcippornis p. magnirostris* (Walden) and like that form has sooty brown coronal stripes and a grayish brown head (thus differing from *Alcippornis p. harringtoniae* Hartert). From *Alcippornis p. magnirostris* the subspecies *alearis* differs in its darker, less olive brown, back; duller, less cinnamon-rufous rump and outer edges of the wing feathers; and in its more cinnamon-rufous under parts.

**Mixornis rubricapilla lutescens** Delacour and Jabouille. YELLOW-BREASTED BABBLER.

*Mixornis rubricapilla lutescens* Delacour and Jabouille, Bull. Brit. Orn. Cl., 47, p. 18, 1926—Bao Ha, Tonkin.

TONKIN: Phong Tho, one ♂, Feb. 24; Lai Chau, one ♂, April 1; Pa Ham, two ♂♂, one ♀, April 7, 8; Muong Moun, three ♂♂, three ♀♀, March 12 to April 8; Ba Nam Nhung, three ♂♂, March 9 to 11; Muong Mo, two ♂♂, March 12, 13; Muong Boum, one ♂, March 28.

LAOS: Phong Saly, two ♂♂, April 29, 30; Muong Yo, one ♂, May 10; Boun Tai, one ♂, two ♀♀, May 24 to 27; Vientiane, one ♂, one ♀, July 1.

We have compared our series with two of Gyldenstolpe's specimens of *minor* from north Siam and with four virtual topotypes of *kinneari*. As Kloss (Ibis, 1918, p. 206) has shown, *minor* of Gyldenstolpe must be a synonym of *sulphurea* Rippon. Delacour did not compare *lutescens* with either of these. As compared with *lutescens* the form *sulphurea* is lighter, more rufous above, crown much brighter chestnut, tail more rufous. The form to the south, *kinneari*, is much darker above and has the throat much more heavily streaked with black.

**Stachyridopsis rufifrons rufifrons** (Hume). HUME'S BABBLER.

*Stachyris rufifrons* Hume, Stray Feathers, 1, p. 479, 1873—Pegu.

TONKIN: Muong Moun, one ♂, one ♀, March 26.

LAOS: Phong Saly, two ♂♂, one ♀, April 26 to May 2.

Hume's Babbler has not been found before in Indo-China.

**Stachyris nigriceps davisoni** Sharpe. MALAY GRAY-THROATED BABBLER.

*Stachyris davisoni* Sharpe, Bull. Brit. Orn. Cl., 1, p. 7, 1892—Pahang.

TONKIN: Lai Chau, one ♀, March 4; Pa Ham, one ♂, April 6; Ba Nam Nhung, one ♂, March 8; Muong Boum, one ♂, March 26.

LAOS: Phong Saly, three ♂♂, one ♀, April 25 to 28; Boun Tai, three ♀♀, May 24 to 31.

**Stachyris chrysoea chrysoea** Blyth. NEPAL GOLDEN-HEADED  
BABBLER.

*Stachyris chrysoea* Blyth, Journ. As. Soc. Bengal, 13, p. 379, 1844—Nepal.  
TONKIN: Chapa, one ♀, Feb. 12.

This is a very bright orange-yellow specimen. This may be due to its being in fresh plumage though Delacour and Kinnear have also remarked on the brightness of Tonkin specimens.

**Thringorhina striolata diluta** Kinnear. TONKINESE SPOTTED  
BABBLER.

*Thringorhina guttata diluta* Kinnear, Bull. Brit. Orn. Cl., 45, p. 11, 1924—  
Thai Nien, Tonkin.

TONKIN: Muong Mo, one ♂, two ♀ ♀, March 15 to 18.

LAOS: Muong Yo, one ♂, May 14.

**Turdinulus epilepidotus amyae** Kinnear. KINNEAR'S WREN  
BABBLER.

*Turdinulus epilepidotus amyae* Kinnear, Bull. Brit. Orn. Cl., 45, p. 73, 1925—  
Bao Ha, Tonkin.

LAOS: Muong Yo, one unsexed immature (wing 49, tail 26), May 16.

Kinnear (1929, p. 295) states that *laotianus* of Delacour is not separable from *amyae*.

**Gypsophila crispifrons annamensis** Delacour and Jabouille.  
LIME-ROCK BABBLER.

*Corythocichla annamensis* Delacour and Jabouille, Bull. Brit. Orn. Cl., 48,  
p. 131, 1928—Phuqui, n. Annam.

TONKIN: Bac Tan Trai, one ♂, Feb. 26.

The form which we described as *saxatilis* (Field Mus. Nat. Hist., Zool. Ser., 18, No. 1, p. 3, 1930) proves to be the same as that already separated as a full species in the genus *Corythocichla* by Delacour and Jabouille. We have examined Delacour's series and we feel convinced that *annamensis* must be treated as a race of *Gypsophila crispifrons* of Tenasserim.

This species was found only at Bac Tan Trai where Coolidge saw several among the limestone rocks above the Nam Na River and succeeded in collecting one specimen.

**Pellorneum tickelli olivaceum** (Kinnear). TICKELL'S BABBLER.

*Dryocataphus tickelli olivaceus* Kinnear, Bull. Brit. Orn. Cl., 45, p. 11, 1924—  
Bao Ha, Tonkin.



TONKIN: Muong Moun, ten ♂♂, five ♀♀, March 13 to 25; Pa Ham, two ♂♂, one ♀, April 7, 8; Ba Nam Nhung, two ♂♂, one ♀, March 11; Muong Mo, one ♂, March 15; Muong Boum, one ♀, March 26.

LAOS: Muong Yo, one ♂, May 14; Vientiane, one ♂, one ♀, June 30, July 2.

We follow Baker (Birds Brit. Ind., 1, p. 247) in including this species in the genus *Pellorneum*. The two specimens from Vientiane are paler than the rest of our series but this may be only because they are in worn plumage.

***Pellorneum ignotum cinnamomeum* Rippon. RIPPON'S  
BABBLER.**

*Drymocapthus cinnamomeus* Rippon, Bull. Brit. Orn. Cl., 11, p. 12, 1900—  
Loi Mai, Shan States.

TONKIN: Chapa, one ♀, Feb. 13; Lai Chau, one ♂, April 1.

These two specimens are identical with the type of *Drymocapthus pusillus* Delacour (Bull. Brit. Orn. Cl., 47, p. 161) but Delacour now considers this merely a rufous throated phase of the white-throated *P. ignotum cinnamomeum*.

***Pellorneum ruficeps vividum* La Touche. YUNNAN SPOTTED  
BABBLER.**

*Pellorneum nipalense vividum* La Touche, Bull. Brit. Orn. Cl., 42, p. 17, 1921—  
Hokow, Yunnan.

TONKIN: Lai Chau, one ♂, March 2; Pa Ham, two ♂♂, one ♀, April 7, 8; Muong Moun, three ♂♂, March 16 to 29.

LAOS: Phong Saly, one ♂, one ♀, April 30, May 1; Boun Tai, two ♂♂, four ♀♀, May 24 to 30; Vientiane, three ♂♂, one ♀, July 1.

La Touche's two cotypes of *vividum* are darker than most of our specimens but we doubt whether they represent well the average of the region. A male from Szemao from the La Touche collection is like our Indo-China birds. We believe that *vividum* is not a local form, as La Touche supposed it to be, but that his types are simply two birds in fresh plumage and rather darker than the average. Our specimens have a darker mantle and heavier streaks below than five specimens of *subochraceum* from Tenasserim which we have examined. As Kinnear says (1929, p. 294) *minor* is not separable from *subochraceum*. The type of *smithi*, which we have examined, is very different from any other specimen we have seen. Its peculiarities may be partly due to the make of the skin which was not well filled out. Kinnear (1929) used the name *smithi* for Tonkin birds, but whatever *smithi* may be, the name *vividum* has priority for the bird of Tonkin.

***Pyctorhis sinensis major* La Touche. YUNNAN YELLOW-EYED  
BABBLER.**

*Pyctorhis sinensis major* La Touche, Handbook Birds Eastern China, p. 72,  
July, 1925—Mongtze, Yunnan.

LAOS: Phong Saly, one ♂, April 24.

Our single specimen agrees well with the type and a series of thirty-two birds from Yunnan in being larger and darker than a small series of typical *sinensis* from India. The type specimen, although not designated in the original description, is a male collected March 1, 1921, at Mongtze, Yunnan.

***Gampsorhynchus rufulus luciae* Delacour. WHITE-HEADED  
SHRIKE BABBLER.**

*Gampsorhynchus rufulus luciae* Delacour, Bull. Brit. Orn. Cl., 47, p. 16, 1926—  
Xieng Kouang, Laos.

TONKIN: Pa Ham, two ♂♂, one unsexed, March 8.

Iris Apricot Yellow.

***Timelia pileata dictator* Kinnear. INDO-CHINESE RED-CAPPED  
BABBLER.**

*Timelia pileata dictator* Kinnear, Bull. Brit. Orn. Cl., 50, p. 55, 1930—Dran,  
s. Annam.

LAOS: Phong Saly, five ♂♂, two ♀♀, April 25 to May 4; Muong Yo, two  
♂♂, May 11, 17.

Upon first examining this series we immediately noted that they were decidedly paler than specimens of *T. pileata intermedia*. We then sent specimens for comparison to Mr. Kinnear who confirmed our opinion and subsequently separated the form as *Timelia pileata dictator*.

***Pomatorhinus hypoleucus tickelli* Blyth. TICKELL'S SCIMITAR  
BABBLER.**

*Pomatorhinus tickelli* Blyth, Journ. As. Soc. Bengal, 24, p. 273, 1855—Tenas-  
serim.

TONKIN: Muong Mo, one ♂ (wing 106), March 19.

LAOS: Muong Yo, one ♂ (wing 108), one ♀ (wing 97), May 16, 17.

This species has been separated into four forms in Indo-China, but with the small amount of material available it does not seem justified. There is much variation in color and, since the male is apparently larger than the female, the variation in size is obscured by the study of poorly sexed skins.

**Pomatorhinus erythrogenys odicus** Bangs and Phillips. RUSTY-CHEEKED SCIMITAR BABBLER.

*Pomatorhinus maclellandi odicus* Bangs and Phillips, Bull. Mus. Comp. Zool., 58, p. 286, 1914—Mongtze, Yunnan.

TONKIN: Mao Xao Phing, one ♂, April 8; Lieng San, two ♀ ♀, April 5.

LAOS: Lao Fou Tchai, one ♂, one ♀, April 21; Phong Saly, three ♂ ♂, one unsexed, April 27 to May 4.

This species had not been collected previously in Indo-China. Delacour and Jabouille (L'Oiseau, 11, July, 1930, p. 400) have recently described *minor* from Tonkin, but, even after re-examination of our material, we can not recognize the form. We have compared our six adults with twenty-one skins of *odicus*, including the type, and find no difference either in size or in color. Our series measures: Wing: ♂ ♂ 85, 87, 88, 90, 90; ♀ ♀ 80, 84, 89.

**Pomatorhinus ochraceiceps ochraceiceps** Walden. LLOYD'S SCIMITAR BABBLER.

*Pomatorhinus ochraceiceps* Walden, Ann. Mag. Nat. Hist., 12, (4), p. 487, 1873—Karen Hills, Burma.

TONKIN: Muong Moun, one ♀, March 20.

**Pomatorhinus phayrei orientalis** Delacour. CORAL-BILLED SCIMITAR BABBLER.

*Pomatorhinus ferruginosus orientalis* Delacour, Bull. Brit. Orn. Cl., 47, p. 159, 1927—Tam Dao, Tonkin.

TONKIN: Chapa, one ♀, Feb. 11.

Iris Cream Buff, bill Flame Scarlet, feet Citrine Drab, claws Tawny Olive.

We do not consider *ferruginosus* conspecific with *phayrei*. The former has a sharply differentiated black crown and greatly elongated loreal feathers, while the *phayrei* group all have the crown and back brown and the lores normal.

**Pomatorhinus ruficollis reconditus** Bangs and Phillips. MENG-TSZE RUFOUS-NECKED SCIMITAR BABBLER.

*Pomatorhinus ruficollis reconditus* Bangs and Phillips, Bull. Mus. Comp. Zool., 58, p. 286, 1914—Mongtze, Yunnan.

TONKIN: Lieng San, one ♂ (wing 79), April 5.

Our one specimen closely resembles the type and seventeen other specimens from the Mongtze region. Kinnear (1929, p. 148) lists six specimens from the Red River valley and considers *saturatus* Delacour not separable from *reconditus*.

**Pomatorhinus ruficollis albipectus** La Touche. LA TOUCHE'S  
RUFIOUS-NECKED SCIMITAR BABBLER.

*Pomatorhinus ruficollis albipectus* La Touche, Handbook Birds Eastern China, p. 69, 1925—Szemao, Yunnan.

TONKIN: Lieng San, one ♂, two ♀ ♀, one unsexed, April 4, 5.

LAOS: Phong Saly, two ♀ ♀, April 25; Muong Yo, one ♂, May 16.

This series of seven specimens resembles quite closely the type and two other specimens of *albipectus* from Szemao. It is noteworthy that the most typical *albipectus* of our series is a male taken at the same time and place as the above-listed male of *reconditus*. Perhaps the two forms meet without intergradation at Lieng San.

**Garrulax canorus canorus** (Linnaeus). HWAMEI.

*Turdus canorus* Linnaeus, Syst. Nat., 1758, p. 169—China.

TONKIN: Chapa, one ♂, Feb. 14; Lai Chau, three ♂ ♂, one ♀, Feb. 28 to March 6; Muong Moun, one ♂, two ♀ ♀, March 16 to April 2; Ba Nam Nhung, one ♂, one ♀, March 10, 11; Muong Mo, three ♂ ♂, March 14 to 16.

LAOS: Lao Fou Tchai, one ♂, April 21; Boun Tai, two ♀ ♀, May 23, 31.

These sixteen specimens are slightly darker than the twenty-five year old Chinese skins with which La Touche compared the two Hokow specimens which he named *namtiense* (Ibis, 1923, p. 317), but the difference is slight and we suspect that it may be entirely due to museum aging.

**Garrulax squamatus** (Gould). BLUE-WINGED LAUGHING THRUSH.

*Ianthocincla squamata* Gould, P. Z. S. Lond., 1835, p. 48—Sikkim.

TONKIN: Lieng San, one ♀, April 5.

**Garrulax merulinus obscurus** Delacour and Jabouille. SPOTTED-  
BREASTED LAUGHING THRUSH.

*Garrulax merulinus obscurus* Delacour and Jabouille, L'Oiseau, 11, July, 1930, p. 399—Chapa, Tonkin.

TONKIN: Chapa, one ♂, Feb. 11.

**Garrulax erythrocephalus connectans** (Delacour). RED-HEADED  
LAUGHING THRUSH.

*Trochalopteryx erythrocephalus connectans* Delacour, Bull. Brit. Orn. Cl., 49, p. 58, 1929—Phu-Ke, Xieng Kouang, Laos.

TONKIN: Chapa, one ♂, two ♀ ♀, Feb. 15; Lieng San, two ♂ ♂, two ♀ ♀, April 5 to 7.

A single specimen of this very distinct form which we named *hendeei* (Field Mus. Nat. Hist., Zool. Ser., 18, No. 1, p. 3, 1930)

was remarked upon by Delacour and Jabouille earlier (1927, p. 121) but not named. Later, however, Delacour changed his mind and published a description.

***Garrulax moniliger melli* Stresemann. CHINESE NECKLACED LAUGHING THRUSH.**

*Garrulax moniliger melli* Stresemann, Journ. f. Orn., 71, p. 364, 1923—Mantsi-Shan, Prov. Kuangtung.

TONKIN: Bac Tan Trai, one ♀, Feb. 26; Muong Moun, two ♂♂, one ♀, March 18, 19; Ba Nam Nhung, one ♀, March 10; Muong Boum, one ♀, March 23.

Delacour (Bull. Brit. Orn. Cl., 47, p. 158) described *Garrulax moniliger tonkinensis* as being like "*G. m. melli* Stresemann from S. E. China, but of a darker and less ochraceous brown above and with flanks of a deeper reddish-orange." We have compared our six specimens with five taken at the same season in Fukien and find the color of the back identical in the two series. Both show a wide variation in the color of the flanks and are not separable by this character. We therefore consider *tonkinensis* a synonym of *melli* Stresemann.

***Garrulax leucolophus diardi* (Lesson). SIAMESE WHITE-CRESTED LAUGHING THRUSH.**

*Turdus diardi* Lesson, Traite d'Orn., p. 408, 1831—Siam.

TONKIN: Phong Tho, two ♂♂, one ♀, Feb. 22, 23; Lai Chau, one ♂, one ♀, March 4, April 1; Muong Moun, three ♂♂, two ♀♀, March 11 to 28; Ba Nam Nhung, one ♂, one ♀, March 8, 9; Muong Mo, two ♂♂, three ♀♀, March 13 to 17; Muong Boum, three ♂♂, one ♀, March 22 to 28.

LAOS: Phong Saly, one ♀, April 29; Muong Yo, one ♀, May 20; Boun Tai, one ♂, one ♀, May 25, 30.

***Garrulax sannio* Swinhoe. WHITE-BROWED LAUGHING THRUSH.**

*Garrulax sannio* Swinhoe, Ibis, 1867, p. 403—Amoy.

TONKIN: Chapa, one ♀, Feb. 12; Ye Yen Sun, one ♂, Feb. 21; Lieng San, five ♂♂, two ♀♀, April 4 to 7; Mao Xao Phing, one ♂, April 8.

LAOS: Bao Fou Tchai, one ♂, April 21; Phong Saly, seven ♂♂, one ♀, April 24 to May 4.

***Garrulax chinensis chinensis* (Scopoli). BLACK-THROATED LAUGHING THRUSH.**

*Lanius chinensis* Scopoli, Del. Flor. et Faun. Ins., 2, p. 86, 1786—"China," see Kinnear (1929, p. 146).

TONKIN: Lai Chau, two ♀♀, March 3, April 1; Muong Moun, nine ♂♂, three ♀♀, March 13 to 30; Ba Nam Nhung, one ♂, one ♀, March 9;

Muong Mo, two ♂♂, two ♀♀, March 13 to 18; Muong Boum, four ♂♂, four ♀♀, March 22 to 26.

LAOS: Phong Saly, one ♂, one ♀, April 30, May 1; Muong Yo, one ♀, May 11; Boun Tai, one ♂, three ♀♀, May 22 to 30.

Iris Ox-blood Red (♀, Muong Moun).

Our specimens are of both the green-backed form and the gray-backed form (*loweri*). Two males taken at Muong Moun in March are more gray than the type of La Touche's *loweri*. This form cannot be recognized on the basis of our material.

As Kinnear suggests, there are clearly two color phases of this species—one with white cheeks (*chinensis*) and one with gray cheeks (*lugens* Oustalet). Our series of thirty-six specimens shows both extremes and all gradations between them. In fact from both Muong Moun and Muong Boum our series shows the whole range of variation in a single collecting locality. The name *lugens* is clearly a pure synonym of *chinensis*.

**Psittiparus gularis laotianus** Delacour. GRAY-HEADED PARROT-BILL.

*Psittiparus gularis laotianus* Delacour, Bull. Brit. Orn. Cl., 47, p. 19, 1926—  
Xieng Kouang, Laos.

LAOS: Phong Saly, two ♂♂ (wing 88, 89), April 28, 29.

**Suthora alphonsiana yunnanensis** La Touche. LA TOUCHE'S SUTHORA.

*Suthora webbiana yunnanensis* La Touche, Bull. Brit. Orn. Cl., 42, p. 31, 1921—  
Kopaotsum.

TONKIN: Chapa, one ♂, Feb. 14.

This is apparently the first record for this species in Indo-China. We have compared our bird with eight specimens of *yunnanensis*, including the type. Except for its fresher and brighter plumage, our specimen is like the series of worn skins collected in Yunnan in May. There is much variation in the color of the crown of the Yunnan birds examined and two specimens approximate very closely our Chapa specimen. We wonder whether *intermedius* of Delacour and Jabouille (L'Oiseau, 11, July, 1930, p. 395) may not be based solely upon birds in fresh, unfaded plumage.

**Paradoxornis guttaticollis** David. AUSTEN'S PARROT-BILL.

*Paradoxornis guttaticollis* David, Nouv. Arch. Mus. Paris, 7, p. 14, 1871—  
w. Szechwan.

LAOS: Phong Saly, two ♂♂, two ♀♀, April 26 to 29.

**Microtarsus atriceps atriceps** (Temminck and Laugier). BLACK-HEADED BULBUL.

*Turdus atriceps* Temminck and Laugier, Plan. Color. d'Ois., 11, pl. 147, 1830—Java designated by Robinson and Kloss, Journ. Fed. Mal. States Mus., 11, p. 55, 1923.

LAOS: Vientiane, one adult ♂ (wing 80), July 1.

**Pycnonotus blanfordi robinsoni** Ogilvie Grant. ROBINSON'S OLIVE BULBUL.

*Pycnonotus robinsoni* Ogilvie Grant, Fasciculi Malayensis, p. 85, 1905—Patani, Malay Peninsula.

LAOS: Vientiane, three ♂♂, one ♀, June 30 to July 2.

**Pycnonotus finlaysoni finlaysoni** Strickland. FINLAYSON'S STRIPE-THROATED BULBUL.

*Pycnonotus finlaysoni* Strickland, Ann. Mag. Nat. Hist., 13, p. 411, 1844—Malaysian Islands.

LAOS: Vientiane, two ♂♂, June 30 to July 3.

**Pycnonotus aurigaster xanthorrhous** Anderson. ANDERSON'S YELLOW-VENTED BULBUL.

*Pycnonotus xanthorrhous* Anderson, Proc. As. Soc. Bengal, 1869, p. 265—Kakhyen Hills.

TONKIN: Chapa, two ♂♂, one ♀, Feb. 12 to 15; Muong Mo, one ♂, one ♀, March 14, 15; Muong Boum, one ♂, March 24; Lieng San, six ♂♂, two ♀♀, April 4 to 7; Mao Xao Ping, one ♀, April 8.

LAOS: Phong Saly, five ♂♂, three ♀♀, April 24 to May 4.

This Bulbul apparently occurs only in the highlands of extreme northern Indo-China. It was first recorded from Indo-China by Delacour (1927, p. 112) who found it common at Nong Het in north Laos. Kinnear (1929, p. 143) also records it from Ngai Tio, Tonkin.

Our specimens are identical with a large series from Yunnan.

**Iole virescens lönnbergi** Gyldenstolpe. SIAMESE BULBUL.

*Criniger lönnbergi* Gyldenstolpe, Kungl. Sv. Vetensk. Handl., 1, No. 8, p. 24—Bang-hue-non, n. Siam.

TONKIN: Phong Tho, one ♂, Feb. 25; Bac Tan Trai, one ♂, Feb. 26; Lai Chau, two ♂♂, one ♀, March 1 to 3; Pa Ham, April 6; Muong Moun, one ♂, three ♀♀, March 11 to 28; Ba Nam Nhung, one ♂, one ♀, March 10; Muong Mo, two ♂♂, March 17 to 19; Muong Boum, five ♂♂, two ♀♀, March 22 to 28.

LAOS: Phong Saly, one ♂, one ♀, April 24 to 29; Muong Yo, three ♂♂, four ♀♀, one unsexed, May 10 to 20; Boun Tai, two ♀♀, one unsexed, May 24 to 29.

The first full plumaged juvenal was collected on May 10 at Muong Yo.

**Spizixos canifrons ingrami** (Bangs and Phillips). INGRAM'S FINCH-BILLED BULBUL.

*Spizixos canifrons ingrami* Bangs and Phillips, Bull. Mus. Comp. Zool., 58, p. 285, 1914—Mongtze, Yunnan.

TONKIN: Lieng San, nine ♂♂, four ♀♀, April 4 to 7; Mao Xao Ping, two ♀♀, April 8.

LAOS: Phong Saly, three ♂♂, three ♀♀, April 24, 25.

We have compared our twenty-one specimens with the type and a series of topotypes of *ingrami* and fail to find any difference. Delacour (Bull. Brit. Orn. Cl., 47, p. 14) has described *laotianus* from Nong Het and Xieng Kouang, Laos, but the characters he mentions are not at all well marked or consistent in our good series.

A female collected at Phong Saly on April 24 contained an egg ready to lay.

**Spizixos semitorques semitorques** Swinhoe. SWINHOE'S FINCH-BILLED BULBUL.

*Spizixos semitorques* Swinhoe, Ibis, 1861, p. 266—Pehling Plateau, Foochow.

TONKIN: Chapa, one unsexed, Feb. 15.

**Elathea flaviventris flaviventris** (Tickell). BLACK-CRESTED YELLOW BULBUL.

*Vanga flaviventris* Tickell, Journ. As. Soc. Bengal, 2, p. 573, 1833—Dholbhum.

TONKIN: Phong Tho, two ♂♂, Feb. 24; Lai Chau, one ♂, March 1; Pa Ham, one ♂, April 8; Muong Moun, one ♂, two ♀♀, March 19 to 27; Ba Nam Nhung, one ♂, March 11; Muong Mo, two ♂♂, one ♀, March 14 to 19.

LAOS: Muong Yo, one ♂, one ♀, May 13, 17; Boun Tai, four ♂♂, May 25, 26; Vientiane, one ♀, June 30.

The specimen from Vientiane has a spot of red and yellow feathers on one side of the chin. Delacour has already recorded two specimens with red on the throat. The iris of this Bulbul varies from Picric Yellow to Primrose Yellow.

**Elathea jocosa jocosa** (Linnaeus). CHINESE RED-WHISKERED BULBUL.

*Lanius jocosus* Linnaeus, Syst. Nat., 1758, p. 95—China.

TONKIN: Phong Tho, three ♂♂, Feb. 23, 24; Ye Yen Sun, two ♂♂, one ♀, Feb. 21; Lai Chau, one ♂, one ♀, March 1, 3; Pa Ham, one ♂, March 8; Muong Moun, three ♂♂, four ♀♀, March 11 to 29; Ba Nam Nhung, two ♂♂, two ♀♀, March 10, 11; Pou Den Dinh, one ♂, one ♀, April 18.



LAOS: Phong Saly, one ♂, one ♀, April 24, May 1; Muong Yo, two ♂♂, one ♀, May 9 to 18.

**Xanthixus flavescens berliozi** Delacour. BLYTH'S BULBUL.

*Xanthixus flavescens berliozi* Delacour, Bull. Brit. Orn. Cl., 47, p. 14, 1926—Xieng Kouang, Laos.

LAOS: Lao Fou Tchai, one ♂, April 21; Phong Saly, five ♂♂, one ♀, April 25 to May 2.

**Molpastes cafer chrysorrhoides** (Lafresnaye). CHINESE RED-VENTED BULBUL.

*Haematornis chrysorrhoides* Lafresnaye, Rev. Zool., p. 367, 1845—China.

TONKIN: Lai Chau, three ♂♂, two ♀♀, Pa Ham, one ♀, April 8; Muong Moun, one ♀, March 25; Ba Nam Nhung, three ♀♀, March 9 to 11.

LAOS: Phong Saly, one ♂, two ♀♀, April 24 to May 4; Muong Yo, two ♂♂, May 19, 20.

Wing: ♂♂ 100, 100, 97, 97, 98, 98; ♀♀ 90, 95, 95, 93, 94, 95, 94.

**Molpastes cafer klossi** Robinson. SIAMESE RED-VENTED BULBUL.

*Molpastes atricapillus klossi* Robinson, Bull. Brit. Orn. Cl., 41, p. 12, 1920—Koon Tan, n. Siam.

LAOS: Vientiane, one ♂ (wing 91), July 1.

This race has not been generally recognized but our specimen agrees with eight from near Quang Tri, Annam, and two topotypes of *klossi* in being smaller and paler above. The bill of *klossi* is also much smaller than in our specimens of *chrysorrhoides* from northern Tonkin and Laos.

**Alcurus striatus** (Blyth). STRIATED BULBUL (Plate III, lower figure).

*Trichophorus striatus* Blyth, Journ. As. Soc. Bengal, 11, p. 184, 1842—Nepal.

TONKIN: Muong Moun, one ♂ (wing 107), March 14.

LAOS: Phong Saly, two ♂♂ (wing 103, 102), two ♀♀ (wing 103, 103), April 24 to 26.

The Striated Bulbul has not been taken before in Indo-China.

**Hemixus flavala bourdellei** Delacour. BROWN-EARED BULBUL.

*Hemixus flavala bourdellei* Delacour, Bull. Brit. Orn. Cl., 47, p. 13, 1926—Xieng Kouang, Laos.

TONKIN: Muong Mo, two ♂♂, one ♀, March 14 to 18.

LAOS: Phong Saly, one ♂, four ♀♀, April 27 to May 2; Muong Yo, two ♀♀, May 15, 19.

Our series shows well the characters of this very distinct form. The species was breeding at Phong Saly and Muong Yo.

**Hemixus maccllellandi similis** (Rothschild). RUFIOUS-BELLIED BULBUL.

*Iole maccllellandi similis* Rothschild, Novit. Zool., 28, p. 51, 1921—Shweli-Salween Divide, Yunnan.

TONKIN: Chapa, eight ♂♂, three ♀♀, one unsexed, Feb. 12 to 15; Muong Mo, one ♀, March 15; Lieng San, two ♂♂, April 6.

LAOS: Phong Saly, two ♂♂, three ♀♀, April 25 to May 2.

The Rufous-bellied Bulbul was found only in the highlands of northern Indo-China.

**Microcelis leucocephalus** (Gmelin). WHITE-HEADED BLACK BULBUL.

*Turdus leucocephalus* Gmelin, Syst. Nat., 1, 1789, p. 826—China.

1. The "*leucocephalus*" phase.

TONKIN: Phong Tho, two ♂♂, one ♀, Feb. 23 to 25; Lai Chau, one ♂, March 1; Nam Nen, one ♀, March 9; Muong Moun, two ♂♂, March 10, 12; Muong Mo, five ♂♂, March 13 to 19; Nong Lum, one ♀, March 20; Muong Boum, one ♀, March 21.

We have listed here all specimens with *any* white on the head. There is a tremendous variation in the amount of white. Our specimens range all the way from one with a pure white head and upper breast to the Nam Nen bird which has but four white feathers immediately behind the nostrils. We consider that our series of *leucocephalus* intergrades completely with the series of "*sinensis*" listed below.

2. The "*sinensis*" phase.

TONKIN: Chapa, two ♂♂, Feb. 15; Phong Tho, one ♂, Feb. 24; Lai Chau, two ♂♂, March 4, 5; Muong Moun, one ♂, March 10; Ba Nam Nhung, one ♀, March 9; Muong Mo, one ♂, March 19.

Iris Madder Brown, bill Brazil Red, feet English Red (*leucocephalus* and "*sinensis*" colored alike).

**Microcelis concolor** (Blyth). BURMESE BLACK BULBUL.

*Hypsipetes concolor* Blyth, Journ. As. Soc. Bengal, 18, p. 816, 1849—Tenasserim.

TONKIN: Ye Yen Sun, three ♂♂, one ♀, Feb. 21; Phong Tho, one ♂, Feb. 23; Lai Chau, two ♂♂, March 5; Muong Moun, two ♂♂, March 13; Ba Nam Nhung, two ♂♂, March 9; Muong Mo, two ♂♂, two ♀♀, March 13 to 15; Muong Boum, one ♀, March 25; Pou Den Dinh, two ♂♂, one ♀, April 18.

LAOS: Lao Fou Tchai, one ♂, one ♀, April 21; Phong Saly, one ♂, April 30.

We believe this to be a full species, not intergrading in any way with *leucocephalus* or "*sinensis*" and certainly not a color phase, although the young of the latter approach it closely in superficial appearance. *Microcelis concolor* is blue rather than black above and is uniform below (lacking the whitish mid-ventral line).

***Criniger tephrogenys henricii* Oustalet. YUNNAN WHITE-THROATED BULBUL.**

*Criniger henricii* Oustalet, Bull. Mus. d'Hist. Nat. Paris, 2, p. 185, 1896—Yunnan and Tonkin.

TONKIN: Bac Tan Trai, one ♂, Feb. 26; Lai Chau, two ♂♂, March 1 to 4; Muong Moun, two ♂♂, one ♀, March 14 to 27; Ba Nam Nhung, one ♂, one unsexed, March 8, 9; Muong Mo, seven ♂♂, three ♀♀, March 16 to 19; Muong Boum, six ♂♂, March 22 to 27.

LAOS: Phong Saly, one ♀, May 1; Muong Yo, three ♂♂, two ♀♀, May 9 to 15; Boun Tai, one ♂, two ♀♀, May 27 to 31.

Wing: Tonkin ♂♂ 115, 114, 113, 108, 108, 109, 109, 112, 109, 105, 105, 108, 110, 111, 111, 112, 113, 110, 109; ♀♀ 109, 105, 106, 106. Laos ♂♂ 113, 111, 112, 113; ♀♀ 106, 105, 107, 109.

***Criniger tephrogenys annamensis* Delacour and Jabouille. ANNAM WHITE-THROATED BULBUL.**

*Criniger tephrogenys annamensis* Delacour and Jabouille, Arch. d'Hist. Nat., 1, p. 123, 1925—Lao Bao, Annam.

LAOS: Vientiane, two ♀♀ (wing 105, 106), July 1, 3.

These two southern Laos specimens are rather small and very yellow below like three birds from Quang Tri with which we have compared them. Apparently *annamensis* is a well marked form.

***Irena puella puella* (Latham). FAIRY BLUEBIRD.**

*Coracias puella* Latham, Index Orn., 1, p. 171, 1790—India.

TONKIN: Phong Tho, two ♂♂, Feb. 23, 25; Pa Ham, one ♂, one ♀, March 8, April 6; Muong Moun, one ♂, March 22; Muong Mo, eight ♂♂, four ♀♀, March 13 to 19; Muong Boum, eleven ♂♂, two ♀♀, March 22 to 28.

LAOS: Phong Saly, one ♂, April 25; Muong Yo, four ♂♂, two ♀♀, May 10 to 19; Boun Tai, two ♂♂, one ♀, May 24 to 26.

Iris Begonia Rose, bill and feet black.

A male taken March 13 is still in the immature plumage except for a single black breast feather. Other young males taken March 14 and 28 and May 10 show the feathers of the adult plumage coming in irregularly among the contour feathers, lesser wing coverts, and tail coverts. Specimens taken at Boun Tai were breeding.

**Cinclus pallasii souliei** Oustalet. CHINESE BROWN DIPPER.

*Cinclus Pallasii* var. *Souliei* Oustalet, Ann. Sc. Nat. Zool., (7), 12, p. 299, 1892—Tatsien Lu.

TONKIN: Chapa, two ♂♂, Feb. 12, 13; Ngai Tio, one ♀, Feb. 20; Muong Moun, two ♂♂, March 26.

Iris Bister.

We have compared our specimens with a series of thirty-two adult birds from Szechuan, Hupeh, and Kansu and consider them identical. The Dipper has not been taken before in Indo-China.

**Cochoa viridis** Hodgson. GREEN THRUSH.

*Cochoa viridis* Hodgson, Journ. As. Soc. Bengal, 5, p. 359, 1836—Nepal.

TONKIN: Muong Moun, one unsexed, March 17; Muong Mo, one ♂, March 16.

LAOS: Phong Saly, one ♂, one ♀, April 29, May 2; Muong Yo, one ♀, May 13.

Specimens taken at Phong Saly were in breeding condition.

**Myiophoneus caeruleus immansuetus** Bangs and Penard.  
VIOLET WHISTLING THRUSH.

*Myiophoneus caeruleus immansuetus* Bangs and Penard, Occ. Papers Bost. Soc. Nat. Hist., 5, p. 147, 1925—Ichang, Hupeh.

TONKIN: Chapa, one ♂, one ♀, Feb. 15.

We have compared our specimens with the type and a series of eight of *immansuetus* and with fifteen specimens of typical *caeruleus*, which is apparently confined to Fukien and Kwang-tung. A worn specimen from Mengtsze, Yunnan, we refer to *immansuetus*.

**Myiophoneus eugeniae** Hume. BURMESE WHISTLING THRUSH.

*Myiophoneus Eugeniae* Hume, Stray Feathers, 1, p. 475, 1873—w. Pegu Hills and Thayetmyo.

TONKIN: Chapa, one ♂, Feb. 13; Lai Chau, two ♀♀, March 2, April 1; Muong Moun, four ♀♀, March 18 to 23; Ba Nam Nhung, one ♀, March 9; Ba Nam Cai, one ♀, March 11; Muong Mo, one ♂, March 14; Muong Boum, one ♂, March 26; Lieng San, two ♂♂, one ♀, April 5, 6.

**Monticola solitaria pandoo** (Sykes). INDIAN BLUE ROCK THRUSH.

*Petrocincla pandoo* Sykes, P. Z. S. Lond., 1832, p. 87—Ghauts, India.

TONKIN: Lai Chau, one ♀, March 6; Muong Boum, one ♂, one ♀, March 24, 27.

These specimens have no trace of chestnut spots below.

**Zoothera marginata** Blyth. LESSER BROWN THRUSH.

*Zoothera marginata* Blyth, Journ. As. Soc. Bengal, 16, p. 141, 1847—Arakan.

TONKIN: Phong Tho, one ♀, Feb. 25.

**Turdus aureus** Holandre. WHITE'S THRUSH.

*Turdus aureus* Holandre, F. de M. Ann. de la Moselle, p. 60, 1825—Metz.

TONKIN: Muong Moun, two ♂♂ (wing 172, 147), two ♀♀ (wing 161, 158),  
March 16 to 23; Muong Mo, one ♂ (wing 175), March 17.

This series is uniformly referable to *aureus* except for a male (March 19) from Muong Moun which resembles *angustirostris* Gyldenstolpe (Ornith. Monat., 24, p. 28, 1916) in its much smaller size (wing 147) and in being more heavily spotted and more reddish. The wing formula, however, is like our other specimens and does not agree with the description of *angustirostris*.

**Turdus citrinus innotatus** (Blyth). MALAY GROUND THRUSH.

*Georchla innotata* Blyth, Journ. As. Soc. Bengal, 15, p. 370, 1846—Malay Peninsula.

LAOS: Phong Saly, one adult ♂ (wing 115), April 28.

We assign this specimen to *innotatus* but it is not perfectly typical. The wings have a very slight whitish spot on the coverts, thus showing a tendency toward *citrinus*. The under tail coverts are not pure white but are tinged with yellow.

**Turdus sibirica sibirica** Pallas. PALLAS' SIBERIAN GROUND THRUSH.

*Turdus sibiricus* Pallas, Reise Russ. Reich., 3, p. 694, 1776—Daurica.

LAOS: Phong Saly, one ♂, one ♀, April 28, May 4.

**Turdus obscurus obscurus** Gmelin. GRAY-HEADED THRUSH.

*Turdus obscurus* Gmelin, Syst. Nat., 1, 1789, p. 816—Lake Baikal.

LAOS: Phong Saly, two ♂♂, two ♀♀, April 26 to 30.

**Turdus dissimilis** Blyth. BLACK-BREASTED THRUSH.

*Turdus dissimilis* Blyth, Journ. As. Soc. Bengal, 16, p. 144, 1857—Lower Bengal.

TONKIN: Muong Mo, two ♀♀, March 17.

**Turdus merula mandarinus** Bonaparte. CHINESE BLACKBIRD.

*Turdus mandarinus* Bonaparte, Consp. Av., 1, p. 257, 1850—s. China.

TONKIN: Muong Mo, one ♀, March 12.

**Turdus cardis lateus** Thayer and Bangs. CHINESE GRAY THRUSH.

*Turdus cardis lateus* Thayer and Bangs, Bull. Mus. Comp. Zool., 52, p. 140, 1909—Ichang, Hupeh.

TONKIN: Muong Moun, one ♂, March 27.

This specimen resembles closely the type of *lateus*.

***Kittacincla malabarica interposita* Robinson and Kloss. INDO-CHINESE SHAMA.**

*Kittacincla malabarica interposita* Robinson and Kloss, Journ. Fed. Malay States Mus., 10, p. 262, 1920—s. Annam.

TONKIN: Muong Moun, one ♂, March 26; Muong Boum, one ♂, March 25.

LAOS: Boun Tai, one immature ♂, May 28; Vientiane, one ♂, July 3.

We lack comparative material for a critical determination of the subspecies of this Shama.

***Copsychus saularis saularis* (Linnaeus). INDIAN MAGPIE ROBIN.**

*Gracula saularis* Linnaeus, Syst. Nat., 1758, p. 109—Asia = Bengal.

TONKIN: Phong Tho, three ♂♂, Feb. 24; Lai Chau, five ♂♂, one ♀, Feb. 28 to March 6; Muong Moun, four ♂♂, three ♀♀, March 11 to 29; Ba Nam Nhung, one ♂, one ♀, March 9, 10; Muong Mo, one ♂, March 14; Muong Boum, two ♀♀, March 23, 28.

LAOS: Phong Saly, one ♂, May 1; Muong Yo, three ♂♂, three ♀♀, May 9 to 19; Boun Tai, seven ♂♂, three ♀♀, May 22 to 31; Muong Ngoi, one immature ♀, June 10.

A fully fledged juvenal was collected on May 26 at Boun Tai.

***Muscisylvia leucura* Hodgson. WHITE-TAILED BLUE ROBIN.**

*Muscisylvia leucura* Hodgson, P. Z. S. Lond., 1845, p. 27—Nepal.

TONKIN: Muong Moun, four ♂♂, four ♀♀, March 13 to 21; Lieng San, two ♂♂, April 4, 7; Muong Mo, two ♂♂, one ♀, March 16 to 19.

LAOS: Phong Saly, two ♀♀, April 27, May 2 (breeding).

***Ianthia cyanura cyanura* (Pallas). JAPANESE BUSH ROBIN.**

*Motacilla cyanura* Pallas, Reise Russ. Reich., 2, p. 709, 1773—Yenesei.

TONKIN: Chapa, four ♂♂, one ♀, one unsexed, Feb. 11 to 15; Muong Boum, one ♂, March 25.

***Ianthia cyanura practica* Bangs and Phillips. RED-FLANKED BUSH ROBIN.**

*Ianthia practica* Bangs and Phillips, Bull. Mus. Comp. Zool., 58, p. 292, 1914—Loukouchai, Yunnan.

TONKIN: Chapa, two ♂♂, Feb. 12, 13; Lieng San, one ♀, April 4.

The one adult male agrees closely with the type of *practica* and with breeding birds from Kansu. Some doubt has been cast upon this form but we would retain it until the Chinese bird can be proved to be the same as the Indian.

**Calliope calliope** (Pallas). COMMON RUBY-THROAT.

*Motacilla calliope* Pallas, Reise Russ. Reich., 3, p. 697, 1776—Yenesei.

TONKIN: Muong Moun, two ♂♂, March 19, 20; Ba Nam Cai, one ♂, March 11.

LAOS: Phong Saly, four ♂♂, nine ♀♀, April 24 to 28.

**Rhyacornis fuliginosa fuliginosa** (Vigors). PLUMBEUS RED-START.

*Phoenicurus fuliginosa* Vigors, P. Z. S. Lond., 1831, p. 35—Himalayas.

TONKIN: Chapa, one ♂, one ♀, Feb. 12, 13; Ye Yen Sun, three ♂♂, two ♀♀, Feb. 21; Muong Moun, one ♂, March 17; Ba Nam Nhung, one ♂, March 10; Muong Boum, one juvenal ♂ (just able to fly), March 28; Mao Xao Phing, one ♂, April 3.

**Chaimarrornis leucocephala** (Vigors). WHITE-CAPPED RED-START.

*Phoenicura leucocephala* Vigors, P. Z. S. Lond., 1831, p. 35—Himalayas.

TONKIN: Chapa, one unsexed, Feb. 13; Ngai Tio, one ♀, Feb. 20; Bac Tan Trai, one ♂, Feb. 26; Lai Chau, one ♀, March 1.

**Phoenicurus ochruros rufiventris** (Vieillot). EASTERN INDIAN REDSTART.

*Oenanthe rufiventris* Vieillot, Nouv. Dict. d'Hist. Nat., Nouv. Ed., 21, p. 431, 1818—India.

TONKIN: Mao Xao Phing, one ♀, April 3.

This Redstart has not been found before in Indo-China.

**Phoenicurus aureus** (Pallas). DAURIAN REDSTART.

*Motacilla aureus* Pallas, Reise Russ. Reich., 3, p. 695, 1776—Lake Baikal.

TONKIN: Muong Moun, one ♂, March 14; Muong Mo, one ♀, March 19.

**Phoenicurus frontalis** Vigors. BLUE-FRONTED REDSTART.

*Phoenicurus frontalis* Vigors, P. Z. S. Lond., 1831, p. 172—Himalayas.

TONKIN: Chapa, two ♂♂, one ♀, Feb. 12, 13.

**Rhodophila ferrea haringtoni** (Hartert). DARK GRAY BUSH CHAT.

*Oreicola ferrea haringtoni* Hartert, Vög. Pal. Faun., 1, p. 711, 1910—Moupin.

TONKIN: Phong Tho, one ♀, Feb. 24; Pa Ham, one ♂, March 3; Muong Moun, one ♀, March 22; Ba Nam Nhung, one ♀, March 9; Muong Mo, one ♂, March 13.

LAOS: Phong Saly, one ♂, April 26.

Tail: 59, 57, 60, 60, 60, 64.

Mathews (Bull. Brit. Orn. Cl., 47, p. 120, 1927) has shown that *Rhodophila* Jerdon must be used instead of *Oreicola* Bonaparte.

***Rhodophila melanoleuca* Jerdon. JERDON'S BUSH CHAT.**

*Rhodophila melanoleuca* Jerdon, Birds of India, 2, p. 128, 1863—Purnea, India.

LAOS: Muong Yo, one breeding ♀, May 12.

*Oreicola jerdoni* Blyth (Ibis, 1867, p. 14) is only a new name for this species.

***Saxicola torquata przewalskii* (Pleske). TURKESTAN BUSH CHAT.**

*Oreicola jerdoni* Blyth (Ibis, 1867, p. 14) is only a new name for this species.

*Pratincola maura* var. *przewalskii* Pleske, Wiss. Res. Przewalskis Reisen, 1, p. 46, 1889—Kansu.

TONKIN: Chapa, four ♂♂, three ♀♀, Feb. 11 to 15; Mao Xiao Ping, two ♂♂, one ♀, April 3.

These skins are a trifle larger and decidedly darker than specimens of *stejnegeri*, the form to which Delacour refers his Indo-Chinese specimens.

Wing: Tonkin ♀♀ 70.5, 71, 71.5, 72, 72.

***Brachypteryx nipalensis nipalensis* Hodgson. NEPAL SHORT-WING.**

*Brachypteryx nipalensis* Hodgson, P. Z. S. Lond., 1854, p. 74—Nepal.

TONKIN: Muong Moun, one ♂, one ♀, March 19, 27; Lieng San, one ♂, one ♀, April 5, 7.

LAOS: Phong Saly, four ♂♂, one ♀, April 25 to 30.

La Touche (Bull. Brit. Orn. Cl., 8, p. 9, 1898) described *carolinae* from Kuatun, northwest Fukien, but did not say how or even *whether* it differed from *nipalensis*. As compared with our series, his two types are reddish brown instead of olive brown. However, this is just the change which regularly takes place in old museum skins of birds of this type of coloration and we believe the difference may be due entirely to the age of the type specimens. The Szechwan bird, called *hartertii* by Wiegold, was separated on its olive brown color, probably also due to the mere freshness of the specimens. We have but one specimen of *nipalensis* for comparison, but as no one has yet shown any valid reason for separating the south China and Indo-China birds from typical *nipalensis* we retain that name for our skins.

Our six males, two of which are marked adults, are all brown, not blue.



**Larvivora cyane** (Pallas). SIBERIAN BLUE CHAT.

*Motacilla cyane* Pallas, Reise Russ. Reich., 3, p. 697, 1776—Daurien.

LAOS: Phong Saly, three ♂♂, April 25 to 30.

**Larvivora sibilans** Swinhoe. SWINHOE'S RED-TAILED ROBIN.

*Larvivora sibilans* Swinhoe, P. Z. S. Lond., 1863, p. 292—Marco, China.

TONKIN: Muong Moun, three ♀♀, March 11 to 19.

**Hodgsonius phoenicuroides** (Gray). HODGSON'S SHORTWING.

*Brachypterus phoenicuroides* Gray, Cat. Birds of Nepal, pp. 70 and 153, 1846—Nepal.

TONKIN: Lieng San, one ♀, April 7.

LAOS: Phong Saly, one immature ♂, April 24.

Baker (Bull. Brit. Orn. Cl., 42, p. 18) has separated the Chinese from the Indian form largely on its supposedly smaller size. Our specimens have a wing measurement of 69 and 71 mm. and are therefore small like Baker's *ichangensis*. However, we rather doubt the validity of this separation. We have no Indian specimens for comparison but four males from Szechuan which we have examined measure (wing) 74 to 75 mm.

The species has not been taken before in Indo-China.

**Prinia inornata exter** Thayer and Bangs. CHINESE WREN WARBLER.

*Prinia inornata exter* Thayer and Bangs, Mem. Mus. Comp. Zool., 40, p. 182, pl. 5, 1912—Hokow, w. Szechwan.

LAOS: Phong Saly, one ♂, one ♀, April 27, 29; Muong Yo, one ♂, May 13; Vientiane, one ♂, July 2.

**Prinia flaviventris flaviventris** (Delessert). YELLOW-BELLIED WREN WARBLER.

*Orithotomus flaviventris* Delessert, Rev. Zool., p. 101, 1840—Bootan, n. Bengal.

TONKIN: Lai Chau, one ♂, March 1.

LAOS: Phong Saly, three ♂♂, two ♀♀, April 27 to 30; Muong Yo, one ♀, May 19.

The Yellow-bellied Wren Warbler has apparently not been taken before in Tonkin or Laos.

**Suya superciliaris superciliaris** (Anderson). ANDERSON'S HILL WARBLER.

*Saya superciliaris* Anderson, P. Z. S. Lond., 1871, p. 212—Momien, Yunnan.

TONKIN: Chapa, one ♂, Feb. 11; Muong Boum, one ♀, March 21; Mao Xao Phing, one ♂, April 3; Lieng San, one ♀, April 6.

LAOS: Phong Saly, eleven ♂♂, five ♀♀, April 24 to May 2.

**Phyllergates coronatus coronatus** (Blyth). GOLDEN-HEADED WARBLER.

*Orithotomus coronatus* Blyth, P. Z. S. Lond., 1861, p. 200—Sikkim.

TONKIN: Phong Tho, one ♀, Feb. 25.

LAOS: Phong Saly, one ♂, five ♀♀, April 24 to 30.

**Urophlexis squamiceps** (Swinhoe). SWINHOE'S REED WARBLER.

*Tribura squamiceps* Swinhoe, P. Z. S. Lond., 1863, p. 292—Canton.

TONKIN: Muong Moun, one ♂, March 12.

For the use of *Urophlexis* instead of *Urosphena* see Stuart Baker (Birds of British India, 7, p. 198).

**Homochlamys diphone canturians** (Swinhoe). CHINESE BUSH WARBLER.

*Arundinax canturians* Swinhoe, Ibis, 1860, p. 52—Amoy.

TONKIN: Lai Chau, three ♂♂, Feb. 28 to March 6.

For the use of this generic name instead of *Horornis* see Stuart Baker (Birds of British India, 7, p. 195).

**Homochlamys pallidiceps laurentei** (La Touche). LAURENTE'S BUSH WARBLER.

*Urosphena laurentei* La Touche, Bull. Brit. Orn. Cl., 42, p. 30, 1921—Poutousing, Yunnan.

LAOS: Phong Saly, one breeding ♀, April 29.

**Homochlamys fortipes davidiana** (Verreaux). DAVID'S BUSH WARBLER.

*Arundinax davidiana* Verreaux, Nouv. Arch. Mus. Paris Bull., 6, p. 37, 1870—Moupin.

TONKIN: Lieng San, one unsexed, April 4.

LAOS: Phong Saly, four ♂♂, six ♀♀, April 24 to 26.

**Abrornis superciliaris salwinensis** Baker. YELLOW-BELLIED FLYCATCHER WARBLER.

*Abrornis superciliaris saluinensis* Baker, Bull. Brit. Orn. Cl., 44, p. 62, 1924—Salween.

TONKIN: Muong Moun, one ♂, March 16; Ba Nam Nhung, one ♂, March 9; Muong Boum, one ♂, one ♀, March 28.

LAOS: Phong Saly, three ♂♂, two ♀♀, April 30 to May 2.

**Seicercus burkii tephrocephalus** (Anderson). ANDERSON'S FLY-CATCHER WARBLER.

*Culicipeta tephrocephala* Anderson, P. Z. S. Lond., 1871, p. 213 Bhamo, Burma.

TONKIN: Muong Moun, one ♀, March 15; Lieng San, one ♂, one ♀, one unsexed, April 5, 7.

LAOS: Phong Saly, three ♀ ♀, April 24.

**Phylloscopus trochiloides trochiloides** (Sundevall). BLYTH'S CROWNED WILLOW WARBLER.

*Acanthiza trochiloides* Sundevall, Physiogr. Sällskapet's Tidsk., 1, p. 76, 1837—Calcutta.

TONKIN: Muong Moun, one ♀, March 21.

LAOS: Phong Saly, one ♂, one ♀, April 29, May 1; Muong Yo, one ♂, May 11.

As Gyldenstolpe has shown (Bull. Brit. Orn. Cl., 46, 1925, p. 46) this name is the correct one for the bird formerly known as *Phylloscopus lugubris* Blyth.

**Phylloscopus reguloides assamensis** Hartert. BAKER'S WILLOW WARBLER.

*Phylloscopus trochiloides assamensis* Hartert, Vög. Pal. Faun., p. 2139, 1921—Shillong.

TONKIN: Lieng San, one ♂, April 6.

LAOS: Phong Saly, two ♂ ♂, three ♀ ♀, April 24 to 30.

Stuart Baker described this form as *harterti* but the name proves to be preoccupied and Hartert has therefore substituted *assamensis*.

**Phylloscopus occipitalis coronatus** (Temminck and Schlegel). TEMMINCK'S CROWNED WILLOW WARBLER.

*Ficedula coronata* Temminck and Schlegel, Fauna Japonica, Aves, p. 48, pl. 18, 1847—Japan.

TONKIN: Muong Moun, two ♂ ♂, two ♀ ♀, March 16 to 19; Muong Boum, two ♂ ♂, March 22, 26; Lieng San, one ♂, April 5.

**Phylloscopus inornatus inornatus** (Blyth). CROWNED WILLOW WARBLER.

*Regulus inornatus* Blyth, Journ. As. Soc. Bengal, 11, (1), p. 191, 1842—India.

TONKIN: Muong Moun, five ♂ ♂, March 11 to April 3; Ba Nam Nhung, one ♂, one ♀, March 9; Lieng San, two ♂ ♂, April 4, 6.

LAOS: Lao Fou Tchai, two ♀ ♀, April 21; Phong Saly, one ♀, April 25.

**Phylloscopus proregulus forresti** Rothschild. FORREST'S WILLOW WARBLER.

*Phylloscopus proregulus forresti* Rothschild, Novit. Zool., 28, p. 45, 1921—  
Lichiang Range, Yunnan.

TONKIN: Chapa, one ♀, Feb. 11.

**Phylloscopus subaffinis** Ogilvie Grant. YELLOW-BELLIED BUSH WARBLER.

*Phylloscopus subaffinis* Ogilvie Grant, Bull. Brit. Orn. Cl., 10, p. 37, 1900—  
Pu-an-ting, s. w. Kweichow.

TONKIN: Chapa, one ♀, one unsexed, Feb. 12, 14; Lieng San, two ♂♂,  
April 4.

**Phylloscopus armandii** (Milne-Edwards). MILNE-EDWARDS WILLOW WARBLER.

*Abornis armandii* Milne-Edwards, Nouv. Arch. Mus. Paris, 1, Bull. 10, p. 22,  
1865—n. China.

LAOS: Phong Saly, two ♀♀, April 24, 27.

**Phylloscopus fuscatus fuscatus** (Blyth). DUSKY WILLOW WARBLER.

*Phylloscopus fuscatus* Blyth, Journ. As. Soc. Bengal, 11, p. 113, 1842—Calcutta.

TONKIN: Muong Moun, one ♂, March 15; Muong Mo, one ♀, March 19.

LAOS: Phong Saly, two ♂♂, one ♀, April 26 to 29.

We have examined two topotypes of *robustus* identified by Stresemann, but are unable to verify the characters of that supposed form.

**Phylloscopus trivirgatus ricketti** (Slater). RICKETT'S WILLOW WARBLER.

*Cryptolopha ricketti* H. H. Slater, Ibis, 1897, p. 174, pl. 4—Kuatun, Fukien.

TONKIN: Muong Moun, one unsexed, March 28; Pa Ham, one ♀, April 7.

**Phylloscopus pernotus** Bangs and Van Tyne. LAOTIAN WILLOW WARBLER (Plate III, upper figure).

*Phylloscopus pernotus* Bangs and Van Tyne, Field Mus. Nat. Hist., Zool. Ser.,  
18, No. 1, p. 4, 1930—Muong Yo, Laos.

LAOS: Muong Yo, one adult ♀ (the type), May 19.

This very distinct species is somewhat similar to *Phylloscopus trivirgatus ricketti* but is smaller and has the breast and belly white instead of bright yellow. The upper parts are rather duller olive

green than in *Phylloscopus t. ricketti* and the dark head stripes duller-olivaceous dusky instead of black. The throat and under tail coverts are yellow and the breast and belly white, becoming grayish on the sides.

Wing: 50. Tail: 35.5 mm.

**Megalurus palustris andrewsi** Bangs. ANDREWS' STRIATED MARSH WARBLER.

*Megalurus palustris andrewsi* Bangs, Bull. Am. Mus. Nat. Hist., 44, p. 592, 1921 Meng-tung, Burma border of Yunnan.

TONKIN: Phong Tho, one ♀, Feb. 24; Lai Chau, two ♂♂, one ♀, Feb. 28 to March 6; Muong Moun, one ♀, March 26; Mao Xao Phung, one ♂, April 8.

LAOS: Muong Yo, three ♂♂, one ♀, May 10 to 18.

**Franklinia gracilis** (Franklin). FRANKLIN'S WREN WARBLER.

*Prinia gracilis* Franklin, P. Z. S. Lond., 1831, p. 119 Vindhyan Hills, India.

LAOS: Phong Saly, one ♂, one ♀, April 26, 30; Muong Yo, one ♂, May 9.

**Franklinia rufescens rufescens** (Blyth). BEAVAN'S WREN WARBLER.

*Prinia rufescens* Blyth, Journ. As. Soc. Bengal, 16, p. 456, 1847 - Arakan.

TONKIN: Pa Ham, one ♂, April 6.

LAOS: Vientiane, two ♂♂, July 3.

The specimen from Tonkin is much darker and more rufous below and may be referable to *austeni*. We understand from Delacour that he considers this species to be the same as *Franklinia gracilis*.

**Cisticola juncidis tinnabulans** (Swinhoe). CHINESE FAN-TAILED WARBLER.

*Calamanthella tinnabulans* Swinhoe, Journ. N. China Branch Royal As. Soc., 2, p. 225—Amoy.

TONKIN: Muong Moun, one ♂, March 30.

**Orthotomus atrogularis flavoviridis** Moore. BLACK-NECKED TAYLOR BIRD.

*Orthotomus flavoviridis* Moore, P. Z. S. Lond., 1854, p. 72 - Malacca.

TONKIN: Muong Moun, two ♂♂, March 13, April 3; Muong Boum, three ♂♂, March 24 to 26.

LAOS: Boun Tai, two ♂♂, May 24, 30.

Stuart Baker (Birds Brit. India, 2, p. 414) is wrong in giving Malacca as the type locality of *O. a. atrogularis* which was actually

Described from Borneo. *O. a. flavoviridis* is quite different from the Bornean form.

***Orthotomus sutorius inexpectatus* La Touche. YUNNAN TAYLOR BIRD.**

*Orthotomus sutorius inexpectatus* La Touche, Bull. Brit. Orn. Cl., 43, p. 42, 1922 Mongtze, Yunnan

TONKIN: Pa Ham, one ♂, one unsexed, April 8; Muong Moun, one ♂, March 27; Muong Mo, one ♀, March 12.

LAOS: Phong Saly, two ♀♀, April 29, 30; Muong Yo, one unsexed, May 17; Boun Tai, one ♂, May 28, Pak Si, one immature ♂, June 18; Vientiane, one ♂, July 2

These specimens are very like the type and a good series of *inexpectatus*. They differ from *longicaudus* (of which we consider *phyllocephalus* a synonym) as La Touche says, in being whiter below. We are not sure, however, that all of our specimens are separable from *maculicollis*, of which we have five specimens from Bangkok, for the differences seem to us very slight indeed.

***Tribura luteoventris* Hodgson. BROWN RUSK WARBLER.**

*Tribura luteoventris* Hodgson, P. Z. S. Lond., 1845, p. 30 Cachar.

TONKIN: Mao Xao Phing, one ♂, April 3.

LAOS: Phong Saly, two ♀♀, April 24, 25.

***Locustella certhiola* (Pallas). PALLAS' GRASSHOPPER WARBLER.**

*Motacilla certhiola* Pallas, Zoogr. Ross. Asiat., 1, p. 509, 1827—Lake Baikal.

LAOS: Boun Tai, one ♂, May 29.

Sushkin (Proc. Bost. Soc. Nat. Hist., 38, p. 44, 1925) has separated this species into four subspecies but the distinctions are so close that we do not feel justified in giving a subspecific determination to a single migrant bird, especially with the small amount of comparative material at hand. Our specimen is doubtless a migrant for, according to Stuart Baker, these birds breed late. This warbler has not been recorded before from Indo-China.

***Rhipidura albicollis albicollis* (Vieillot). WHITE-THROATED FAN-TAIL FLYCATCHER.**

*Platyrrhynchus albicollis* Vieillot, Nouv. Dict. d'Hist. Nat., 27, p. 13, 1818—Bengal.

TONKIN: Phong Tho, one ♀, Feb. 25; Lai Chau, two ♀♀, Feb. 28, March 1; Pa Ham, one ♂, March 8; Muong Boum, one ♀, March 23; Muong Mo, one ♂, one ♀, March 17, 19; Lieng San, two ♂♂, one ♀, April 5 to 7.

LAOS: Phong Saly, three ♂♂, three ♀♀, April 24 to 26; Muong Yo, one ♂, one ♀, May 15; Boun Tai, one ♂, one ♀, May 25, 30.

This Flycatcher was noted as breeding at Phong Saly and Muong Yo.

**Hypothymis azurea styani** (Hartlaub). BLACK-NAPED FLY-CATCHER.

*Siphia styani* Hartlaub, Abh. Nat. Ver. Bremen, 16, 2, p. 248, 1898 Horkow, Hainan.

TONKIN: Muong Moun, one ♂, March 25; Pa Ham, one ♂, April 8; Muong Mo, one ♂, March 16.

LAOS: Phong Saly, one ♂, one ♀, April 28, May 1; Muong Yo, four ♂♂, three ♀♀, May 10 to 20; Boun Tai, two ♂♂, May 28; Vientiane, one ♂, one ♀, July 1, 3.

**Terpsiphone paradisi affinis** (Blyth). BURMESE PARADISE FLY-CATCHER.

*Terpsiphone affinis* Blyth, Journ. As. Soc. Bengal, 15, p. 292, 1846—Malay Peninsula.

TONKIN: Pou Den Dinh, one adult ♂, one adult ♀, April 18.

LAOS: Muong Yo, two adult ♂♂ (brown tail), one adult ♀, May 10 to 19.

Orbital skin Campanula Blue, bill Cadet Blue, feet Deep Dutch Blue (Tonkin pair).

**Niltava macgrigoriae** (Burton). SMALL NILTAVA.

*Phoenicurus MacGrigoriae* Burton, P. Z. S. Lond., 1835, p. 152 Himalayas.

TONKIN: Chapa, one ♂, Feb. 15; Ye Yen Sun, one ♂, Feb. 21; Lieng San, one ♂, one ♀, April 6, 7.

**Niltava grandis grandis** (Blyth). LARGE NILTAVA.

*Chalcophaps grandis* Blyth, Journ. As. Soc. Bengal, 11, p. 189, 1842 Darjeeling.

TONKIN: Chapa, one ♂, Feb. 15.

**Niltava davidi lychnis** Thayer and Bangs. HUPEH NILTAVA.

*Niltava lychnis* Thayer and Bangs, Bull. Mus. Comp. Zool., 52, p. 141, 1909—Pao-tung, Hupeh.

TONKIN: Ba Nam Cai, one ♀, March 11.

LAOS: Phong Saly, one ♂, April 26.

La Touche (Handbook Birds East. China, p. 171, 1925) now recognizes this race of *Niltava davidi*.

**Culicicapa ceylonensis antioxantha** Oberholser. CHINESE GRAY-HEADED FLYCATCHER.

*Culicicapa ceylonensis antioxantha* Oberholser, Smiths. Misc. Coll., 76, p. 9, 1923—Khaw Sai Dow, Trang, Lower Siam.

TONKIN: Lai Chau, one unsexed, March 6; Pa Ham, one ♀, March 8; Muong Moun, one ♂, March 15; Ba Nam Nhung, one ♂, March 8.

LAOS: Phong Saly, two ♂♂, April 24, 28; Muong Yo, one ♂, one ♀, May 15, 20.

We have compared our specimens of this distinct race with the large series in the British Museum.

***Anthipes moniliger leucops* (Sharpe). SHARPE'S WHITE-GORGETED FLYCATCHER.**

*Digenia leucops* Sharpe, P. Z. S. Lond., 1888, p. 246--Shillong.

TONKIN: Muong Moun, one ♀, March 23.

LAOS: Phong Saly, one ♂, one ♀, April 25, 29.

***Eumyias thalassina thalassina* (Swainson). VERDITER FLY-CATCHER.**

*Muscicapa thalassina* Swainson, Jardine and Selby, Nat. Libr., 17, append., p. 252, 1838 India.

TONKIN: Phong Tho, one ♂, Feb. 24; Lai Chau, one ♂, March 5; Ba Nam Nhung, one ♀, March 11; Muong Mo, one ♂, two ♀♀, one unsexed, March 13 to 15; Muong Boum, three ♂♂, one ♀, March 23 to 27; Mao Xao Phing, one ♂, April 3; Lieng San, five ♂♂, April 4 to 7.

LAOS: Phong Saly, one ♂, two ♀♀, April 25 to May 3.

This Flycatcher was breeding at Phong Saly.

For the use of the name *Eumyias* in place of *Stoporala* see Baker (Birds Brit. India, 7, p. 136).

***Muscicapula banyumas whitei* Harington. BLUE FLYCATCHER.**

*Cyornis whitei* Harington, Ann. Mag. Nat. Hist., (8), 2, p. 245, 1908—Watan, Bhamo Dist.

TONKIN: Muong Moun, four ♂♂, four ♀♀, March 12 to 29; Ba Nam Nhung, one ♂, March 11.

LAOS: Lao Fou Tehai, one ♂, April 21; Phong Saly, one ♂, April 26; Muong Yo, one ♂, one ♀, May 13, 19; Vientiane, two ♂♂, one ♀, July 1 to 3.

A male collected July 1 is in the spotted juvenal plumage.

For the use of the name *Muscicapula* instead of *Cyornis* see Baker (Birds Brit. India, 7, p. 131).

***Muscicapula unicolor unicolor* (Blyth). PALE BLUE FLY-CATCHER.**

*Cyornis unicolor* Blyth, Journ. As. Soc. Bengal, 12, p. 1007, 1843—Darjeeling.

LAOS: Phong Saly, one ♂, April 28; Muong Yo, one ♂, one ♀, May 16.

These males appear exactly like one from Darjeeling, the only one we have for comparison.



**Muscicapula pallipes hainana** (Ogilvie Grant). GRANT'S BLUE FLYCATCHER.

*Siphia hainana* Ogilvie Grant, Bull. Brit. Orn. Cl., 10, p. 36, 1899 Hainan.

TONKIN: Pa Nam, one ♂, one unsexed, April 7; Ba Nam Nhung, one ♂, one ♀, March 11; Muong Mo, five ♂♂, one ♀, March 16 to 19; Muong Boum, one unsexed, March 25.

LAOS: Muong Yo, six ♂♂, one ♀, May 9 to 18; Boun Tai, two ♂♂, two ♀♀, May 25 to 27.

**Muscicapula melanoleuca melanoleuca** Blyth. LITTLE PIED FLYCATCHER.

*Muscicapula melanoleuca* Blyth, Journ. As. Soc. Bengal, 12, p. 940, 1843 Nepal.

TONKIN: Ba Nam Nhung, one ♀, March 9; Pou Den Dinh, one ♀, April 18.

LAOS: Phong Saly, one ♀, April 25.

Stevens (Kinnear, 1929, p. 135) saw some of these Flycatchers in Tonkin but they have not been collected before in Indo-China.

**Muscicapula tricolor tricolor** (Hodgson). SLATY-BLUE FLYCATCHER.

*Digyna tricolor* Hodgson, P. Z. S. Lond., 1845, p. 26 Nepal.

TONKIN: Lieng San, one ♂, April 6.

This Flycatcher was also collected by Stevens at Bao-Ha, Tonkin.

As Kinnear has said (1929, p. 133) specimens from China and Indo-China are all typical *tricolor*, while *cerniviventris* seems to be confined to Manipur, Naga Hills, Chin Hills, and South Shan States.

**Muscicapula hypertythra hypertythra** (Blyth). RUFOUS-BREASTED BLUE FLYCATCHER.

*Muscicapa hypertythra* Blyth, Journ. As. Soc. Bengal, 11, p. 885, 1842 India.

TONKIN: Muong Moun, one ♂, three ♀♀, March 16 to 21; Ba Nam Nhung, one ♀, March 11.

**Muscicapula concreta cyanea** Hume. WHITE-TAILED BLUE FLYCATCHER.

*Muscitrea cyanea* Hume, Stray Feathers, 5, p. 101, 1877 Muleyit.

TONKIN: Muong Moun, one ♂, March 13.

**Muscicapula mugimaki** (Temminck). JAPANESE ROBIN FLYCATCHER.

*Muscicapa mugimaki* Temminck, Pl. Col., pl. 577, fig. 2, 1835 Japan.

TONKIN: Pou Den Dinh, one ♂, April 18.

LAOS: Phong Saly, one ♀, April 25.

This species has not been taken before in Tonkin or Laos.

***Siphia parva albicilla* (Pallas). RED-BREASTED FLYCATCHER.***Muscicapa albicilla* Pallas, Zoogr. Ross. Asiat., 1, p. 462, 1827—Dauria.

TONKIN: Pa Ham, one ♂, April 8; Muong Moun, one ♂, March 15.

LAOS: Phong Saly, two ♀♀, April 27, 30.

***Hemichelidon sibirica sibirica* (Gmelin). SOOTY FLYCATCHER.***Muscicapa sibirica* Gmelin, Syn. Nat., 1, 1788, p. 936—Lake Baikal.

LAOS: Phong Saly, one ♀, May 4.

Our specimen proves to be a migrant example of typical *sibirica* and not the darker *rothschildi* of Yunnan. This race has not been found before in Indo-China.

***Anthus roseatus* Blyth. HODGSON'S PIPIT.***Anthus roseatus* Blyth, Journ. As. Soc. Bengal, 16, p. 437, 1847—Nepal.

TONKIN: Muong Moun, one ♀, March 25.

This is the first record of Hodgson's Pipit in Indo-China.

***Anthus richardi richardi* Vieillot. RICHARD'S PIPIT.***Anthus richardi* Vieillot, Nouv. Dict. d'Hist. Nat., 26, p. 491, 1818—France.

TONKIN: Muong Boum, one ♀, March 27.

LAOS: Phong Saly, one ♂ (wing 93), one ♀ (wing 93), April 29, May 4;  
 Muong Yo, two ♀♀ (wing 91, 93), May 13, 15.

***Anthus richardi rufulus* Vieillot. INDIAN PIPIT.***Anthus rufulus* Vieillot, Nouv. Dict. d'Hist. Nat., 36, p. 494, 1818—Bengal.

LAOS: Muong Yo, four adult ♂♂ (wing 83, 82, 81, 80), one juvenal ♂, one breeding ♀ (wing 75), one unsexed juvenal, May 9 to 16; Doun Tai, one adult ♂ (wing 80), one juvenal ♂, May 28.

Meinertzhagen has recently (Ibis, 1921, p. 651) reviewed the known forms of this species.

***Anthus hodgsoni* Richmond. INDIAN TREE PIPIT.***Anthus hodgsoni* Richmond, Carnegie Inst. Wash., Pub. No. 54, 1, pt. 2, p. 493, 1907—Nepal.

TONKIN: Chapa, two ♂♂, one unsexed, Feb. 12 to 15; Lai Chau, one ♀, March 2; Muong Moun, one ♂, two ♀♀, March 24 to April 1; Ba Nam Nhung, one ♀, March 8; Mao Xao Phing, one ♀, April 3.

LAOS: Phong Saly, one ♀, April 28.

We are unable, even with good series before us, to recognize the subdivisions of this species which have been proposed (see Bull. Mus. Comp. Zool., 68, p. 368).

**Dendronanthus indicus** (Gmelin). FOREST WAGTAIL.

*Motacilla indicus* Gmelin, Syst. Nat., 1, 1789, p. 962—India.

LAOS: Muong Yo, one ♀, May 15.

**Motacilla flava thunbergi** Billberg. GRAY-HEADED WAGTAIL.

*Motacilla thunbergi* Billberg, Syn. Faun. Scand., pt. 2, p. 50, 1828 - Lapland.

LAOS: Muong Yo, one ♂ (wing 82), two ♀ ♀ (wing 83, 78), May 10 to 16.

Delacour has listed this form from Indo-China as *M. f. macronyx* Stresemann, but we are unable to recognize that subspecies, which seems to depend solely on the length of the hind claw, which is an extremely uncertain character at best (see Hartert, Vög. Pal. Faun., p. 2098).

**Motacilla cinerea caspica** (S. G. Gmelin). EASTERN GRAY WAGTAIL.

*Parus caspica* S. G. Gmelin, Reise Russ., p. 104, pl. 20, fig. 2, 1774 Enscli, Ghilan, n. Persia.

TONKIN: Ye Yen Sun, two ♂ ♂, Feb. 21; Phong Tho, two ♂ ♂, Feb. 24, 25; Lai Chau, one ♂, one ♀, March 1, 5; Muong Moun, one ♀, one unsexed, March 16, 29; Ba Nam Nhung, one ♂, three ♀ ♀, March 10, 11.

**Motacilla alba alboides** Hodgson. HODGSON'S PIED WAGTAIL.

*Motacilla alboides* Hodgson, Asiat. Resear., 19, p. 191, 1836 - Nepal.

TONKIN: Phong Tho, two ♂ ♂, Feb. 24, 25; Lai Chau, two ♂ ♂, March 1; Ba Nam Nhung, one ♂, March 11.

LAOS: Mekong River halfway between Luang Prabang and Paklay, one ♂, one ♀, June 20.

The two specimens taken on the Mekong are in heavy molt.

**Motacilla alba leucopsis** Gould. WHITE-FACED WAGTAIL.

*Motacilla leucopsis* Gould, P. Z. S. Lond., 1837, p. 78 India.

TONKIN: Chapa, one ♂, Feb. 14; Lai Chau, one ♂, March 4.

**Motacilla alba ocularis** Swinhoe. STREAK-EYED WAGTAIL.

*Motacilla ocularis* Swinhoe, Ibis, 1860, p. 55 Amoy.

TONKIN: Lai Chau, one ♀, April 1; Lieng San, one ♂, April 7.

**Microcichla scouleri scouleri** (Vigors). LITTLE FORKTAIL.

*Enicurus scouleri* Vigors, P. Z. S. Lond., 1831, p. 174 - Simla.

TONKIN: Chapa, one adult ♀, Feb. 15.

**Enicurus leschenaulti indicus** Hartert. INDIAN FORKTAIL.

*Enicurus leschenaulti indicus* Hartert, Vög. Pal. Faun., p. 760, 1909 - Margherita, Assam.

TONKIN: Lai Chau, two ♂ ♂, March 1, 3; Muong Mo, one ♂, March 15.

**Enicurus schistaceus** Hodgson. SLATY-BACKED FORKTAIL.

*Enicurus schistaceus* Hodgson, As. Res., 19, p. 189, 1836 - Nepal.

TONKIN: Phong Tho, one ♂, Feb. 22; Lai Chau, one ♂, March 1; Muong Moun, three ♂♂, March 16 to 23; Ba Nam Nhung, one ♂, one ♀, March 9, 10; Muong Mo, one ♂, one ♀, March 15, 18.

**Enicurus maculatus robinsoni** Baker. ANNAM SPOTTED FORK-TAIL.

*Enicurus maculatus robinsoni* Baker, Bull. Brit. Orn. Cl., 43, p. 19, 1922—Langham Peaks, S. Annam.

TONKIN: Chapa, one ♂ (wing 108), Feb. 15.

This specimen differs from *guttatus* in its larger size and from *bacatus* in the smaller size of the spots on the back. Baker's *robinsoni* is decidedly larger than *guttatus* although Baker himself in the first part of the original description says that it is smaller. Baker's table of measurements in the latter part of the description shows clearly that *robinsoni* is actually larger and Baker so describes it in the "Birds of British India" (vol. 2, p. 59). Seven males collected by Robinson and Kloss at the same locality in Annam (Ibis, 1919, p. 595) are also large.

**Artamus fuscus** Vieillot. ASHY SWALLOW SHRIKE.

*Artamus fuscus* Vieillot, Nouv. Dict. d'Hist. Nat., 17, p. 297, 1817 - Bengal.

TONKIN: Lai Chau, one ♂, one ♀, March 6 (collected from a large flock).

LAOS: Lao Fou Tchai, one ♀, April 21; Phong Saly, one ♂, one ♀, April 25.

The Swallow Shrike was breeding at Phong Saly.

**Lanius cristatus cristatus** Linnaeus. BROWN SHRIKE.

*Lanius cristatus* Linnaeus, Syst. Nat., 1758, p. 93 - Bengal.

LAOS: Phong Saly, three adult ♂♂, two immature ♀♀, April 29 to May 2; Muong Yo, one adult ♂, May 9.

Four of our six specimens are in adult plumage and all are clearly typical *cristatus* rather than *superciliosus* which is much more chestnut above.

**Lanius tephronotus** (Vigors). GRAY-BACKED SHRIKE.

*Collurio tephronotus* Vigors, P. Z. S. Lond., 1831, p. 43 - Himalayas, Gyantse, Tibet.

LAOS: Phong Saly, one ♂, April 25.

**Lanius schach schach** Linnaeus. CHINESE RUFOUS-BACKED SHRIKE.

*Lanius schach* Linnaeus, Syst. Nat., 1758, p. 94 - China.

TONKIN: Chapa, two ♀♀, Feb. 11; Lai Chau, one ♀, March 2.

**Lanius nigriceps nigriceps** (Franklin). INDIAN BLACK-HEADED SHRIKE.

*Collurio nigriceps* Franklin, P. Z. S. Lond., 1831, p. 117. Ganges, Calcutta to Benares.

TONKIN: Mao Xao Phing, one ♂, April 8.

LAOS: Lao Fou Tchai, one ♂, April 21; Phong Saly, one adult ♂ (2,500 ft.), May 3.

**Lanius colluroides** Lesson. BURMESE SHRIKE.

*Lanius colluroides* Lesson, Voy. Ind. Orient. Belanger, p. 250, 1831. Pegu.

TONKIN: Muong Moun, one ♂, March 10.

Our specimen accords well with the description of *griseicapillus* of Delacour but he now informs us that further collections have shown that the form is not valid.

**Tephrodornis gularis pelvica** (Hodgson). NEPAL WOOD SHRIKE.

*Tentulia pelvica* Hodgson, Ind. Rev., 1, p. 477, 1837. Nepal.

TONKIN: Pou Den Dinh, one ♀ (wing 117), April 18.

LAOS: Muong Yo, one ♂, May 15; Vientiane, one ♂, one ♀ (wing 119), July 2.

Two of our specimens are damaged or molting and all are in very worn and faded plumage, but because of their large size we consider that they can not be referred to *annectens*, the name used by Kinnear (1929, p. 329) for the bird of Siam, Yunnan, and Annam. Even allowing for their faded condition we would identify them with the gray-backed *pelvica* rather than the very dark brown mantled *latouchi* of Fukien and northwest Tonkin.

**Hemipus picatus capitalis** (McClelland). BROWN-BACKED PIED SHRIKE.

*Muscicapa capitalis* McClelland, P. Z. S. Lond., 1839, p. 157. Assam.

TONKIN: Phong Tho, one ♂, Feb. 24; Muong Moun, two ♂♂, two ♀♀, March 21 to 29; Mao Xao Phing, one ♂, April 3.

LAOS: Lao Fou Tchai, one ♂, April 21; Phong Saly, two ♂♂, two ♀♀, April 24 to May 4; Vientiane, one ♀, July 1.

**Sturnopastor capensis floweri** Sharpe. SIAMESE PIED MYNA.

*Sturnopastor floweri* Sharpe, Bull. Brit. Orn. Cl., 7, p. 17, 1897. Pachim, West Central Siam.

LAOS: Muong Yo, three adult ♂♂, three adult ♀♀, two juvenal ♂♂, May 10 to 14.

Iris Warm Buff, orbital skin Orange Rufous, distal half of bill Pinkish Buff, basal half of bill English Red (adult ♀).

The Pied Myna was common in the cleared land about the village of Muong Yo but was not seen elsewhere. It is here recorded from Indo-China for the first time.

All of our specimens have the glossy black back which differentiates this form from *superciliaris* of Burma.

**Aethiopsar grandis grandis** (Horsford and Moore). SIAMESE JUNGLE MYNA.

*Acridotheres grandis* Horsford and Moore, Cat. Birds East Ind. Co., 2, p. 537, 1853—"Sumatra" = Tenasserim.

TONKIN: Lai Chau, one ♂, one ♀, March 3, April 1.

LAOS: Muong Yo, three ♂♂, one ♀, May 9 to 13; Vientiane, one ♀, July 1.

**Aethiopsar cristatellus brevipennis** (Hartert). HAINAN CRESTED MYNA.

*Acridotheres cristatella brevipennis* Hartert, Novit. Zool., 17, p. 250, 1910--Kiungchau, Hainan.

TONKIN: Muong Moun, three ♂♂ (wing 133, 137, 138), one ♀ (wing 133), March 14 to 29.

These specimens differ from a large series from China in having the wing 5-10 mm. shorter. We therefore use the name *brevipennis* although we can not see that they have a smaller bill as Hartert described his Hainan specimens.

**Acridotheres tristis tristis** (Linnaeus). COMMON MYNA.

*Paradisca tristis* Linnaeus, Syst. Nat., 1, 1766, p. 167—"Philippines" = Calcutta.

LAOS: Muong Yo, one ♂, May 9.

**Gracupica nigricollis** (Paykull). BLACK-NECKED MYNA.

*Gracula nigricollis* Paykull, Stockholm Acad. Handl., 28, p. 291, 1807--China.

TONKIN: Lai Chau, three ♂♂, March 3 to April 1; Ba Nam Nhung, one ♂, March 9; Muong Mo, one ♀, March 16.

LAOS: Nam Hou River above Muong Khoun, one juvenal ♀, June 7; Vientiane, one unsexed juvenal, July 3.

**Sturnia malabarica nemoricola** Jerdon. WHITE-WINGED MYNA.

*Sturnia nemoricola* Jerdon, Ibis, 1862, p. 22--Thayetmyo, Burma.

TONKIN: Lai Chau, three ♂♂, one ♀, March 3 to 5; Chieng Chan, one ♀, April 2; Pou Den Dinh, one ♀, April 18.

LAOS: Lao Fou Tchai, one ♀, April 21; Vientiane, two ♂♂, July 1, 3.

***Sturnia sinensis* (Gmelin). CHINESE MYNA.**

*Oriolus sinensis* Gmelin, Syst. Nat., 1, 1788, p. 394, No. 50 China.

TONKIN: Ba Nam Nhung, one ♀, March 11.

***Gracula javana intermedia* A. HAY. INDIAN GRACKLE.**

*Gracula intermedia* A. Hay, Madr. Journ. Lit. Sci., 13, pt. 2, p. 157, 1844 Cachar.

TONKIN: Lai Chau, one ♂, two ♀♀, March 2 to April 1; Nam Nen, one ♂, one ♀, March 9; Muong Moun, four ♂♂, two ♀♀, March 11 to 28; Ba Nam Nhung, one ♀, March 10; Muong Mo, one ♂, three ♀♀, March 15 to 19; Muong Boum, one ♂, two ♀♀, March 27.

LAOS: Muong Yo, two ♂♂, May 11, 20; Vientiane, one ♂, one ♀, July 2, 3.

Bill Flame Scarlet, tip of bill, bare skin of head, feet Deep Chrome (Nam Nen ♂).

We find much variation in the bare areas on the side of the head. The race *intermedia* is supposed to have the bare patch under the eye joined to that on the ear coverts, but in several of our specimens the two areas are divided by a narrow feathered strip. None of our birds approach the larger *javana* in size.

***Arachnothera longirostra longirostra* Latham. LITTLE SPIDER HUNTER.**

*Certhia longirostra* Latham, Ind. Orn., 1, p. 299, 1790 Bengal.

TONKIN: Phong Tho, one ♀, Feb. 23; Pa Ham, one ♂, one ♀, March 8, April 7.

LAOS: Muong Yo, one ♂, May 19; Boun Tai, one ♂, May 30.

***Arachnothera magna magna* (Hodgson). STREAKED SPIDER HUNTER.**

*Cinnyris magna* Hodgson, Ind. Rev., 2, p. 272, 1837 Nepal.

TONKIN: Phong Tho, two ♂♂, one ♀, Feb. 24, 25; Lai Chau, one ♂, March 6; Pa Ham, one ♂, one ♀, March 8, April 8; Muong Moun, two ♂♂, one ♀, March 21 to April 4; Ba Nam Nhung, one ♂, March 10; Pou Den Dinh, one ♂, April 18.

LAOS: Phong Saly, two ♀♀, April 25, 27; Muong Yo, one ♀, May 15.

Bill black, feet Ochraceous Buff.

***Anthreptes nuchalis lisettae* Delacour. BANDED SUNBIRD.**

*Anthreptes hypogrammica lisettae* Delacour, Bull. Brit. Orn. Cl., 47, p. 22, 1926 —Col de Nuages, Annam.

LAOS: Muong Yo, two ♂♂, May 11, 20.

These specimens agree well with the type and the series of this well marked form which we examined in the British Museum.

**Leptocoma flammaxillaris flammaxillaris** (Blyth). BURMESE  
YELLOW-BREASTED SUNBIRD.

*Nectarinia flammaxillaris* Blyth, Journ. As. Soc. Bengal, 14, p. 557, 1845—  
Tenasserim.

LAOS: Vientiane, one ♀, July 2.

**Aethopyga nipalensis nipalensis** (Hodgson). NEPAL YELLOW-  
BACKED SUNBIRD.

*Cinnyris nipalensis* Hodgson, Ind. Rev., 2, p. 273, 1837—Nepal.

TONKIN: Lieng San, three ♂♂, April 6, 7.

This Sunbird has been found in Indo-China only by Stevens, who collected one at Ngai Tio.

**Aethopyga sanguinipecta sanguinipecta** Walden. WALDEN'S  
YELLOW-BACKED SUNBIRD.

*Aethopyga sanguinipectus* Walden, Ann. Mag. Nat. Hist., (4), 15, p. 400,  
1875—Tonghoo Hills, Burma.

TONKIN: Chapa, five ♂♂, Feb. 12 to 14; Muong Moun, two ♂♂, March 19  
to 20; Muong Boun, one ♂, one ♀, March 24, 27; Lieng San, four ♂♂,  
April 4 to 6.

LAOS: Phong Saly, four ♂♂, April 24 to May 1; Muong Yo, three ♂♂,  
one ♀, May 9 to 20; Boun Tai, two ♂♂, May 22, 29.

**Aethopyga dabryi** (Verreaux). DABRY'S SUNBIRD.

*Nectarinia dabryi* Verreaux, Rev. et Mag. Zool., p. 173, pl. 15, 1867—Ta-  
tsien-lu, Szechwan.

TONKIN: Chapa, five ♂♂, Feb. 14, 15.

Dabry's Sunbird was also found by Stevens at Ngai Tio, Tonkin.

**Aethopyga siparaja seheriae** (Tickell). INDIAN YELLOW-BACKED  
SUNBIRD.

*Nectarinia seheriae* Tickell, Journ. As. Soc. Bengal, 2, p. 577, 1833—Seheria,  
Borabhum.

TONKIN: Lai Chau, six ♂♂, March 1 to 5; Muong Moun, one ♂, March 22;  
Ba Nam Nhung, four ♂♂, two ♀♀, March 9 to 11; Muong Mo, two  
♂♂, March 12, 16; Muong Boun, two ♂♂, March 22, 27; Lieng San,  
one ♂ (= ♀?), April 7.

LAOS: Boun Tai, one ♂, May 25.

We have compared these specimens with the series of *tonkinensis* and *mangini* in the British Museum. The subspecies *seheriae* differs sharply from *tonkinensis* in having the under parts yellow green instead of gray barely washed with green.

This form has apparently not been secured before in Indo-China.



**Chalcoparia singalensis koratensis** Kloss. SIAMESE RUBY-CHIEF.

*Chalcoparia singalensis koratensis* Kloss, Ibis, 1918, p. 218. Lat Bua Kao, e. Siam.

TONKIN: Phong Tho, one ♂, one ♀, Feb. 23; Lai Chau, one ♂, one ♀, March 1, 6; Muong Moun, two ♂♂, March 29, April 3.

LAOS: Boun Tai, two ♂♂, May 24, 26.

Our series agrees well with Kloss's description except that the measurements do not show them to be smaller than *singalensis*. Wing: ♀ 55, 57, 55, 56, 56 mm.

**Dicaeum concolor olivaceum** Walden. PLAIN-COLORED FLOWER-PECKER.

*Dicaeum olivaceum* Walden, Ann. Mag. Nat. Hist., (1), 15, p. 401, 1875. Tonghoo Hills, Burma.

TONKIN: Muong Moun, six ♂♂, one ♀, March 21 to April 4; Ba Nam Nhung, two ♂♂, one ♀, March 8, 9; Muong Mo, one ♂, March 19; Muong Boum, two ♂♂, one ♀, March 27.

LAOS: Phong Saly, one ♂, May 2; Muong Yo, two ♂♂, one ♀, May 11 to 20.

This little Flowerpecker was common about certain mistletoe-like plants parasitic on the trees in the region of Muong Moun.

**Dicaeum ignipectum ignipectum** (Blyth). FIRE-BREASTED FLOWERPECKER.

*Myzanthus ignipectus* Blyth, Journ. As. Soc. Bengal, 12, p. 983, 1843. Nepal.

TONKIN: Lieng San, one ♂, April 7.

LAOS: Phong Saly, two ♂♂, one ♀, April 26 to May 2.

**Dicaeum chrysorrheum chrysochlore** Blyth. YELLOW-VENTED FLOWERPECKER.

*Dicaeum chrysochlore* Blyth, Journ. As. Soc. Bengal, 12, p. 1009, 1843. Arakan.

TONKIN: Muong Moun, two ♂♂, March 11, 20; Muong Mo, one ♂, March 19.

**Zosterops simplex simplex** Swinhoe. CHINESE WHITE-EYE.

*Zosterops simplex* Swinhoe, P. Z. S. Lond., 1863, p. 203. China, from Canton to Foochow.

TONKIN: Muong Moun, one ♂, one ♀, March 18, 20; Ba Nam Nhung, one ♂, one ♀, March 10; Muong Mo, three ♂♂, one ♀, March 17 to 19; Muong Boum, one ♂, one ♀, March 22 to 24; Lieng San, one ♂, April 4.

**Zosterops palpebrosa williamsoni** Robinson and Kloss. SIAMESE WHITE-EYE.

*Zosterops palpebrosa williamsoni* Robinson and Kloss, Journ. Nat. Hist. Soc. Siam, 3, p. 445, 1919--west coast of Siam and Selangor.

TONKIN: Muong Moun, nine ♂♂, three ♀♀, March 10 to April 1; Ba Nam Nhung, one ♂, one ♀, March 9, 11; Muong Boum, two ♀♀, March 23.

LAOS: Phong Saly, five ♂♂, one ♀, April 25 to May 2; Muong Yo, one ♀, May 14.

Delacour (1929, p. 429) uses the name *joannae* La Touche. We have compared our series with the types of that form and find them identical, but Rothschild (Novit. Zool., 33, p. 318) contends that *joannae* is a synonym of *williamsoni*.

This species usually shows a slight mid-ventral streak of yellow and, compared with *Z. simplex*, is brighter above and has a richer yellow throat and under tail coverts.

### ***Uroloncha punctulata topela* (Swinhoe). CHINESE SPOTTED MUNIA.**

*Munia topela* Swinhoe, Ibis, 1863, p. 380 Amoy.

TONKIN: Lai Chau, one ♂, April 11; Muong Moun, one immature ♂, March 10; Ba Nam Nhung, one ♂, March 10; Muong Boum, one ♀, March 27.

### ***Uroloncha striata subsquamicollis* Baker. CHINESE SHARP-TAILED MUNIA.**

*Uroloncha acuticauda subsquamicollis* Baker, Bull. Brit. Orn. Cl., 45, p. 59, 1925 Bankasoon.

TONKIN: Muong Moun, six ♂♂, four ♀♀, two unsexed, March 14 to April 2; Muong Boum, four ♂♂, two ♀♀, March 22, 23.

LAOS: Lao Fou Tehai, one ♀, April 21; Phong Saly, one ♂, two ♀♀, April 29 to May 4; Muong Yo, one ♀, May 10; Boun Tai, one ♂, one ♀, May 28; Vientiane, one ♂, July 1.

### ***Munia atricapilla rubronigra* Hodgson. NORTHERN CHESTNUT-BELLIED MUNIA.**

*Munia rubronigra* Hodgson, As. Res., 19, p. 153, 1836 Nepal.

LAOS: Muong Yo, one ♂, May 17.

### ***Passer rutilans intensior* Rothschild. YUNNAN CINNAMON SPARROW.**

*Passer rutilans intensior* Rothschild, Bull. Brit. Orn. Cl., 43, p. 11, 1922 - Mekong Valley.

TONKIN: Chapa, one ♂, one ♀, Feb. 13.

### ***Passer montanus malaccensis* Dubois. MALAY TREE SPARROW.**

*Passer malaccensis* Dubois, Faun. Ill. Vert. Belge, Ois., 1, p. 572, 1885—Malacca.

TONKIN: Muong Moun, three ♂♂, one ♀, March 13 to April 2; Lieng San, one ♂, April 7; Mao Xao Phing, two ♂♂, April 3; Chieng Chan, one ♂, April 2.

LAOS: Phong Saly, three ♂♂, one ♀, one unsexed juvenal, April 25 to May 2;  
Muong Yo, five ♂♂, six ♀♀, May 15 to 19; Pak Si, one ♂, June 18.

The first juvenal was collected April 25 at Phong Saly.

**Melophus melanicterus** (Gmelin). CRESTED BUNTING.

*Fringilla melanicterus* Gmelin, Syst. Nat., 1788, 1, p. 910—Macao.

TONKIN: Ye Yen Sun, one ♂, Feb. 21.

LAOS: Lao Fou Tchai, two ♂♂, April 21; Phong Saly, four ♂♂, two ♀♀,  
April 26 to May 3; Muong Yo, one ♂, May 11.

The Crested Bunting was fairly common in the open grass land  
about Lao Fou Tchai and Phong Saly.

**Emberiza rutila** Pallas. CHESTNUT BUNTING.

*Emberiza rutila* Pallas, Reise Russ. Reich., 3, p. 698, 1776—Mongolia.

LAOS: Phong Saly, one ♀, April 30.

**Emberiza spodocephala melanops** Blyth. BLACK-HEADED  
BUNTING.

*Emberiza melanops* Blyth, Journ. As. Soc. Bengal, 14, p. 554, 1845—Tipperah.

TONKIN: Lai Chau, one ♀, March 6; Muong Boum, one ♀, March 28.

**Emberiza aureola** Pallas. YELLOW-BREASTED BUNTING.

*Emberiza aureola* Pallas, Reise Russ. Reich., 2, p. 711, 1776—Irtysk.

LAOS: Phong Saly, one ♂, April 28; Muong Yo, one ♀, May 11.

**Emberiza pusilla** Pallas. LITTLE BUNTING.

*Emberiza pusilla* Pallas, Reise Russ. Reich., 3, p. 397, 1776—Daurian Alps.

TONKIN: Chapa, two ♂♂, two unsexed, Feb. 12 to 13; Muong Moun, one ♀,  
March 26; Lieng San, three ♀♀, April 5, 6.

LAOS: Phong Saly, two ♀♀, April 24.

**Carpodacus erythrinus murati** Delacour. LAOTIAN ROSE FINCH.

*Carpodacus erythrinus murati* Delacour, Bull. Brit. Orn. Cl., 47, p. 20, 1926  
Nong Het (=Nong Het), Laos.

TONKIN: Lieng San, two ♂♂, April 5, 9.

LAOS: Lao Fou Tchai, two ♀♀, April 21; Phong Saly, one ♂, one ♀, April  
28, 30.

**Mycerobas melanozanthus** (Hodgson). SPOTTED-WINGED  
GROSBEAK.

*Coccothraustes melanozanthus* Hodgson, As. Res., 19, p. 150, 1836—Himalayas.

LAOS: Muong Yo, two ♀♀ (wing 118, 120), May 10, 11.

One of the most interesting discoveries of the expedition was the collecting of this handsome Grosbeak at Muong Yo, its first occurrence in Indo-China. In its Himalayan range the bird is reported to be an inhabitant of the high altitudes. It is noteworthy therefore that these two specimens were collected in May at an altitude of only 2,300 feet.

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BY

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AND

F. J. W. SCHMIDT

WILFRED H. OSGOOD

CURATOR, DEPARTMENT OF ZOOLOGY

EDITOR



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# THE PAINTED TURTLES OF THE GENUS *CHRYSEMYS*

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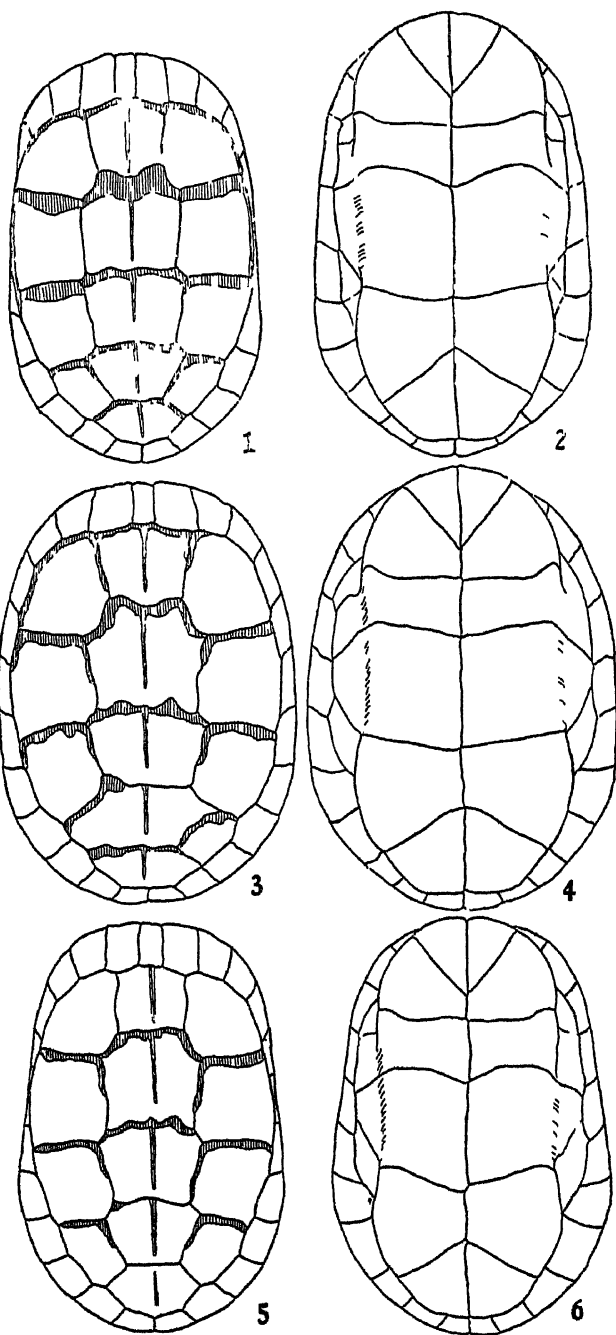
The difficulty experienced in identifying certain painted turtles from eastern New York with either *Chrysemys picta* or *C. bellii marginata* and those from the vicinity of Chicago with either *C. bellii bellii* or *C. bellii marginata*, has led the writers to examine the specimens of these forms in the collections of various institutions, including Field Museum of Natural History, University of Wisconsin, New York State Museum, College of Forestry at Syracuse University, Cornell University, Hobart College and University of Rochester. To the authorities of these institutions we are much indebted for the facilities placed at our disposal.

Certain results of this study throw light on the general taxonomic problem of intergradation between subspecies. *Chrysemys picta* and *C. marginata* have been found to intergrade in a comparatively narrow area in eastern New York where the ranges of the two forms overlap. The subspecies *marginata* and *bellii* intergrade in a rather broad area in the Chicago region. *Chrysemys treleasei* Hurter, recognized in recent lists as a subspecies of *C. bellii*, has been reduced to synonymy.

Among the turtles placed in the genus *Chrysemys*, *C. picta* has been regarded as specifically distinct, and doubtless, when typical specimens are considered, it is the most aberrant member of the group. On the other hand, *bellii*, *dorsalis*, and *treleasei* have at times been designated as subspecies of *marginata* or, more properly, *marginata*, *dorsalis*, and *treleasei* as subspecies of *bellii*. But if intergradation between closely related forms be accepted as indicating subspecific relationship, the various valid forms mentioned above must be regarded as subspecies of *picta*.

Before attempting to indicate more particularly the status of these forms, it may be pertinent to mention briefly the characters which have been proposed to distinguish them. *Chrysemys picta* was described by Schneider in 1783. It is characterized by having the dorsal plates arranged in nearly regular transverse rows and broadly margined anteriorly with yellow. The plastron is yellow and immaculate. In the other members of the genus, the costal



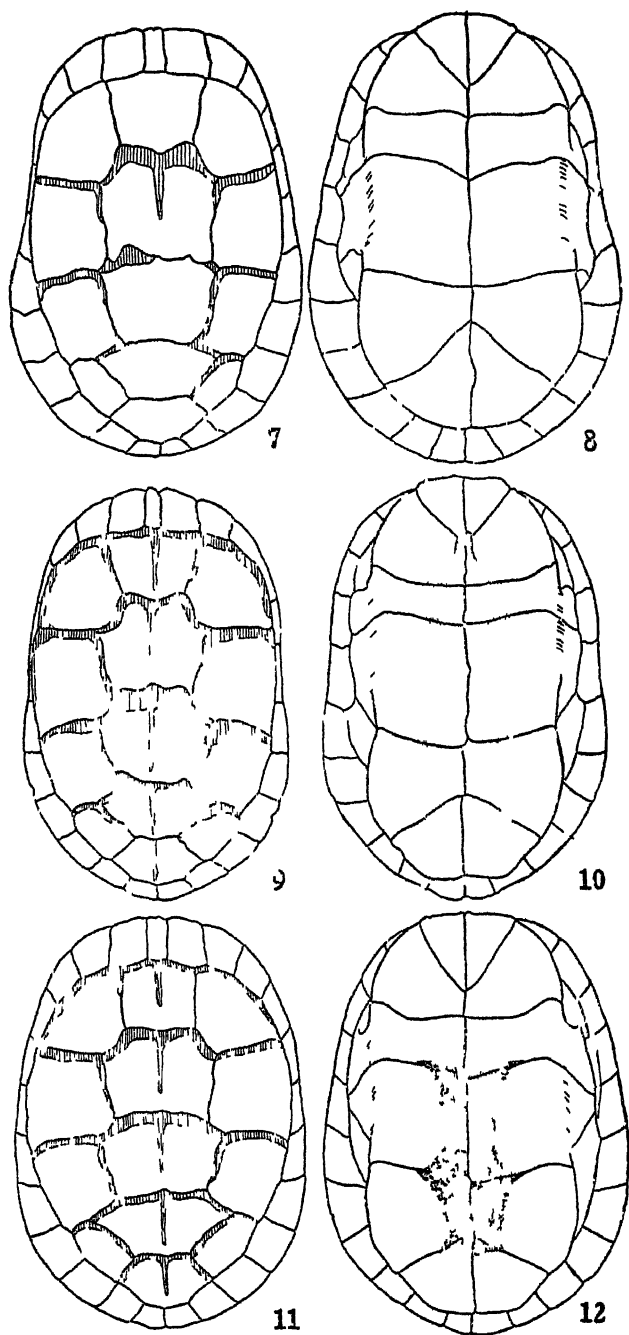


FIGS. 1-6. *Chrysemys picta picta* (Figs. 1-2) and intergrades with *Chrysemys picta marginata*.

plates alternate with those of the vertebral series and the colored margins of the plates are much narrower or absent. *Chrysemys bellii*, described by Gray in 1871, is further distinguished by the presence of net-like light lines on the carapace and by the great development of the plastral marking. In *C. marginata*, described by Agassiz in 1857, the dark ventral figure is much narrower. In *C. dorsalis*, Agassiz, 1857, there is a median dorsal light stripe conspicuously developed and the venter is usually immaculate. *Chrysemys treleasei*, described by Hurter in 1911, was distinguished by the red coloring of the plastron. It should be noted that Agassiz (1857, pp. 438-39) mentioned the occasional absence of the dark ventral figure in *marginata* and said that it was rarely developed in *picta*. Except in the case of *picta*, which has a different plate arrangement, it is obvious that color characters have been mainly relied upon to distinguish the various forms.

In an earlier paper (Bishop, 1923) attention was called to the fact that some painted turtles from eastern New York were intermediate in character between *picta* and *marginata*. Since that time many additional specimens have been collected and of these a sufficient number have been figured to indicate the character of intergradation. The drawings (Figs. 1-24) are reproduced from tracings of photographs which were subsequently bleached, and are therefore accurate.

A typical *picta* from Springfield, Massachusetts, is illustrated (Figs. 1-2, N. Y. S. M. No. 4116, ♀, 133 x 94 mm.). In a specimen (Figs. 3-4, N. Y. S. M. No. 8978, ♀, 140 x 110 mm.) from Hudson, New York, the *picta* characters predominate, but the dorsal plates are less broadly margined and there is a tendency for the costal plates to be slightly out of line with the vertebral. In the Albany, New York, specimen (Figs. 5-6, N. Y. S. M. No. 9017, ♀, 138 x 105 mm.) the dorsal plates are more narrowly or not at all margined and they are slightly out of line. In a single individual from Dunsback Ferry, Saratoga County (Figs. 7-8, N. Y. S. M. No. 9497, ♀, 150 x 112 mm.), the dorsal plates are nearly opposite as in *picta*, some broadly, others only partly margined with yellow. In all the specimens mentioned, the venter is without the dark figure. In a specimen from New Salem, New York (Figs. 9-10, N. Y. S. M. No. 3907, ♀, 161 x 114 mm.), the dorsal plates are broadly margined and intermediate in position while the plastron is provided with a faint interrupted figure. A further development of the ventral figure is to be seen in a specimen from Snyder's Lake, Rensselaer

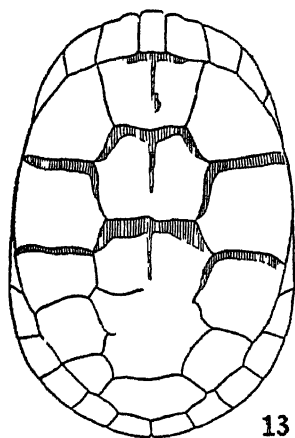


FIGS. 7-12 Specimens intermediate between *Chrysemys picta picta* and *Chrysemys picta marginata*.

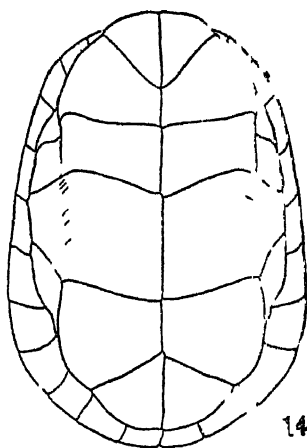
County (Figs. 11-12, N. Y. S. M. No. 3906, ♂, 107 x 82 mm.). The dorsal plates are here broadly margined and nearly opposite, but the venter has a bold figure fully as well developed as in many specimens of *marginata*. A turtle from Voorheesville, New York (Figs. 13-14, N. Y. S. M. No. 9272, ♀, 138 x 100 mm.) has about half the dorsal plates broadly margined but nearly alternating; the venter is immaculate. A second specimen from Albany (Figs. 15-16, N. Y. S. M. No. 8960, ♀, 130 x 94 mm.), presents almost the same condition except that the plates are more perfectly developed. The condition noted in the specimen from New Salem (Fig. 9) is almost duplicated in a turtle from Lake Maxinkuckee, Indiana (N. Y. S. M. No. 4712, ♀, 146 x 108 mm.), a region wholly outside the range of *picta*. In this specimen (Figs. 17-18) it is evident that the ventral figure is only slightly developed and the plates are intermediate in position and broadly margined. The figure is introduced to emphasize the fact that occasionally an aberrantly developed individual may be found in any part of the range of a species. The structural and color characters are again intermediate in character in a specimen from Albany (Figs. 19-20, N. Y. S. M. No. 1188, ♂, 128 x 98 mm.). A specimen from Otisco Lake (Figs. 21-22) is typical of *marginata* in every respect except that the venter lacks the dark figure (N. Y. S. M. No. 4710, ♀, 153 x 114 mm.). Typical *marginata* from Lake Maxinkuckee, Indiana, is illustrated (Figs. 23-24, N. Y. S. M. No. 4711, ♀, 134 x 95 mm.). Some Canandaigua Lake, New York, specimens, otherwise typical *marginata*, are also without the dark plastral marking.

Other intergrades not previously mentioned have been noted from Rensselaer, New York (N. Y. S. M. No. 1726); near Saratoga, New York (N. Y. S. M. No. 1951); Thacher Park, Albany County, New York (N. Y. S. M. No. 9242); and Voorheesville, New York (N. Y. S. M. No. 9273). A single specimen from Chain Bridge, Washington, D. C., which was collected by John Greeley of Cornell University (C. U. No. 1052) has the dorsal plates broadly margined, the plate arrangement intermediate and the plastron with a faint figure. Both *marginata* and *picta* were observed at this locality in the same pool, but below the bridge and within the tidal area *picta* alone was seen, while above only *marginata* was noticed.

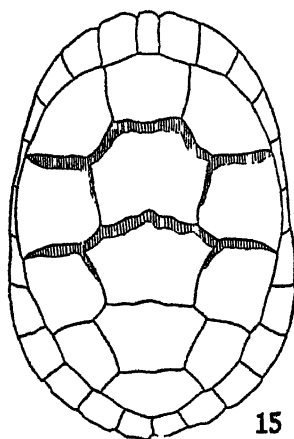
In a series of fifty specimens from the Palisades Interstate Park, preserved in the collection of the Roosevelt Wild Life Forest Experiment Station at Syracuse University, thirteen females and nine males are intermediate in character while twenty-nine are definitely



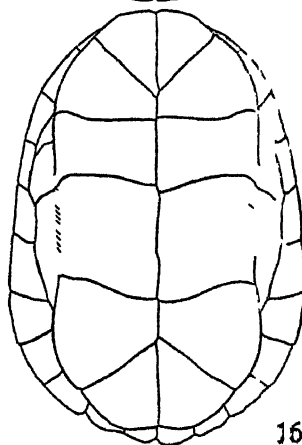
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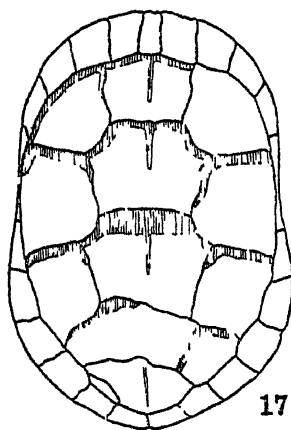
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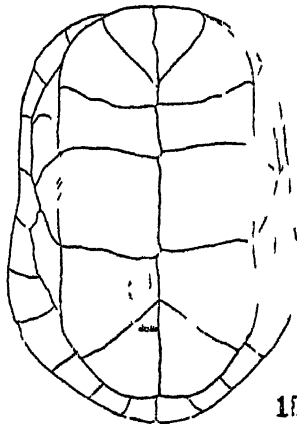
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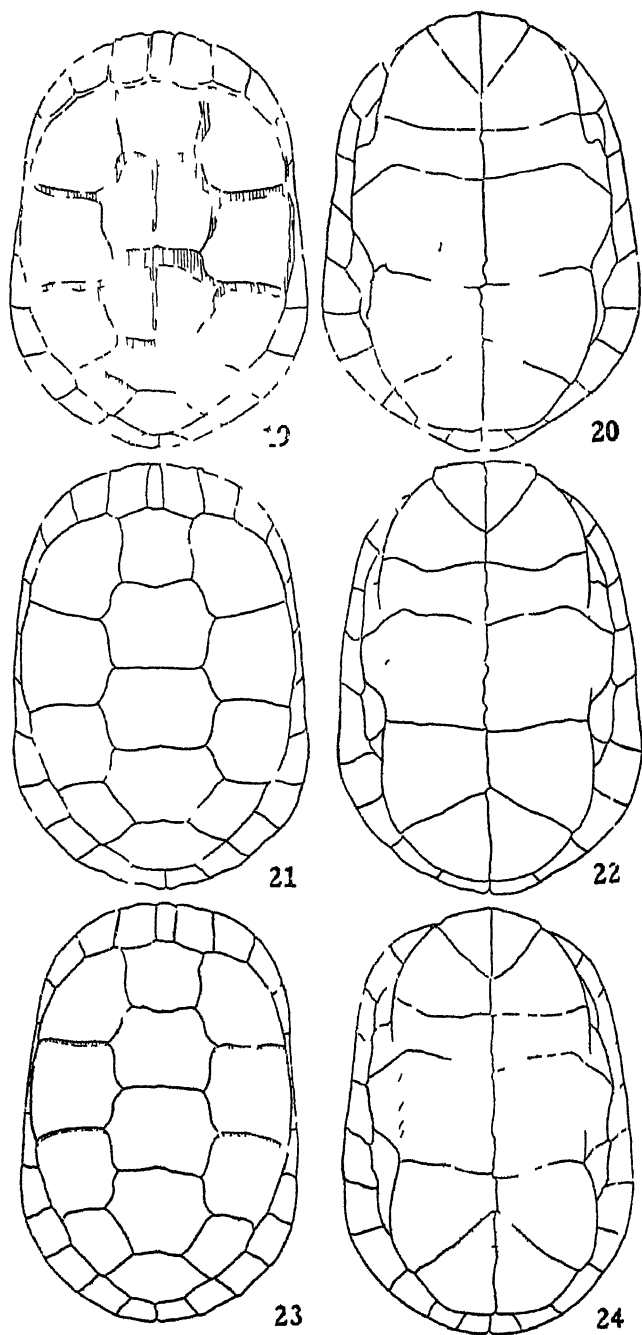
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FIGS. 13-18. Specimens intermediate between *Chrysemys picta picta* and *Chrysemys picta marginata*.

*picta*, a condition which may indicate that in this area there has been an imperfect amalgamation, due, perhaps, to the comparatively recent invasion of *marginata* from the west. Farther to the north, the valley of the Mohawk has provided an uninterrupted waterway from central New York to the Hudson and the majority of the specimens in the vicinity of Albany are intergrades. Within recent times, the Erie canal may also have served as a means of dispersal.

Long Island, Staten Island, and other southeastern New York turtles we have examined have been typical *picta* except two from the extreme eastern end of Long Island, on which red pigment had been deposited. Only a few individuals with *marginata* characters predominating have been noticed as far east as the Hudson River, one on the East Greenbush road three miles southeast of Albany and one at Ballston Spa a few miles west of the river. All those examined from collections made in the central and western parts of the state have been typical *marginata* except as noted in the case of those aberrant individuals lacking the dark ventral figure, collected in Otisco and Canandaigua Lakes.

Basing our judgment on the material examined, we may limit roughly the area in which intergradation occurs in New York state to the valley of the Hudson as far north as Saratoga and south at least to the Palisades Interstate Park. How far the area may extend beyond these limits we have not been able to determine. *Chrysemys picta* has been recorded from Lake George and Lake Champlain but it is possible that intergrades occur in both these localities. It is also true that turtles identified as *picta* have been recorded from many localities in central and western New York, but the records are open to serious question. Thus Hall (1870, p. 19) lists *picta* from Irondequoit Bay, but the specimen itself, a skeleton, prepared at Ward's Natural Science Establishment and now in the New York State Museum, is definitely that of *marginata*. Several of the older records of *picta* were published before *marginata* had been established as a distinct species. De Kay (1842, p. 12) remarked that *picta* was to be found in every part of the state, his account antedating the description of *marginata* by fifteen years. Specimens from Fish Creek, St. Lawrence County, recorded by Hough (1852, p. 23) as *picta*, were also doubtless *marginata*. Eckel and Paulmier (1903, p. 394) lacking De Kay's justification for his belief, perpetuated his error with their statement that *picta* is "Very common throughout the state . . ." Other doubtful records are those of Britcher (1903, p. 122), who identified as *picta* turtles from Tully, Otisco,



FIGS. 19-24. *Chrysemys picta marginata* (Figs. 23-21) and intergrades with *Chrysemys picta picta*.

Seneca River and Dewitt, Onondaga County. We have examined a long series from this general region in the Roosevelt Wild Life Forest Experiment Station collection and have not found *picta* represented. The specimen from Axton, Franklin County, mentioned by Evermann (1911, p. 50) as *picta* is preserved in the National Museum (N. H. No. 23854). It is a recently hatched individual with six instead of five vertebral plates, an arrangement which disturbs the true alignment. The venter, however, has a dark figure and we would regard the specimen simply as an abnormal *marginata*. We have examined the specimen through the courtesy of Miss Doris Cochran of the Division of Reptiles, United States National Museum.

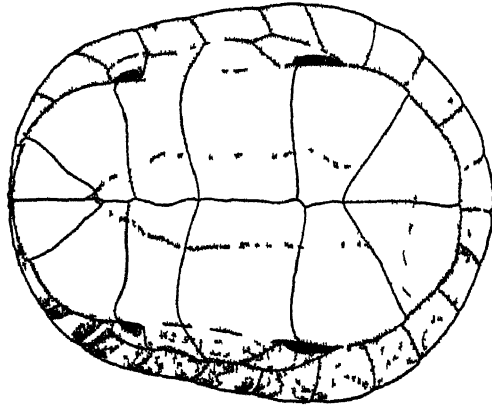
As noted, *marginata* and the more western *belli* differ in a conspicuous color character, the extent of black plastral marking. In *belli* this is nearly as wide as the plastron and sends out arms along the sutures between the various horny plates (Fig. 27). In *marginata* the black marking is narrower, and does not have the conspicuous projections of the western form (Fig. 25). These contrasted characters are figured, with an intermediate specimen from the Chicago area for comparison (Fig. 26). There do not seem to be any structural characters associated with this difference in coloration. This in itself has some bearing on theoretical taxonomy, for Amaral (1929, p. 86) has objected to the establishment of herpetological subspecies on color characters. In the present case a color pattern character affords an adequate distinction between subspecies which have been widely recognized.

The specimens available for study of the *belli*-*marginata* problem fall into three groups: (1) pure *belli*, from west of the Mississippi and from northwestern Wisconsin; (2) pure *marginata* from Indiana, southern Michigan, southeastern Illinois, Ohio, western Pennsylvania, and western New York; and (3) a highly variable, intermediate series from southeastern Wisconsin as far north as Oconto County, northern Illinois north of Chicago, and western Illinois as far south as the mouth of the Illinois River.

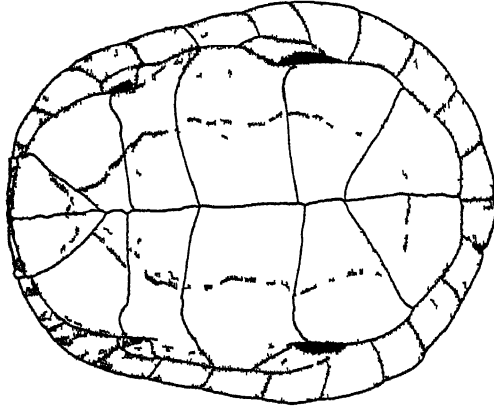
In the pure *belli*, the greatest width of the black marking exceeds at least 55 per cent of the width of the plastron (the distance between the lateral edges of the abdominal plates) in all of the specimens examined, and it exceeds 70 per cent of all the plastral width in thirty-nine of the forty-four specimens, averaging 74 per cent, and ranging from 85 per cent to 56 per cent.

In fifty-one specimens from western New York, Pennsylvania, Ohio, Michigan, Indiana, and southeastern Illinois, the proportion

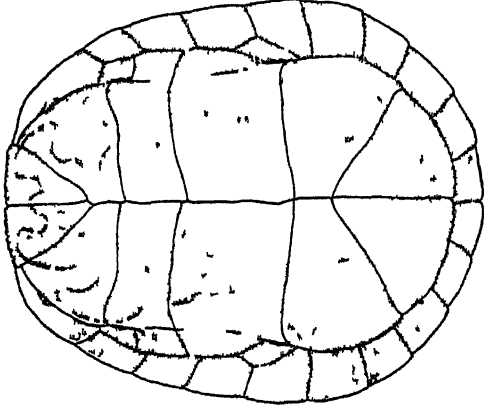




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FIG 25. Type of *arg. nua* from Mineral Springs, Porter County, Indiana F M N H 3318

FIG 26. A specimen from the area intermediate in character between *arg. nua* and *belli* Naperville, Dupage County, Illinois F M N H 7453

FIG. 27. *T. picta belli* from Black River, below Neillsville, Clark County, Wisconsin F M N H 14707

of the width of the black marking to that of the plastron ranges from .13 to .67, averaging only .36. While there is a considerable overlapping of the higher figure for *marginata* with the lower for *bellii*, the number of specimens which are thus outside the normal figures is small in each case. Only one of the fifty-one *marginata* exceeds .55 in this proportion, and only seven exceed .50, while only five of the forty-four *bellii* fall below .70.

The population of painted turtles in the intermediate area, examined with reference to the average width of the black markings, is exactly intermediate between the average figures determined above; eighty-two specimens yield an average figure of .55, .19 below that of pure *bellii*, and .19 above that of pure *marginata*. The range of variation, in this intermediate population, .15 to .78, corresponds nearly to the whole range for both subspecies. The intermediate population accordingly intergrades with the adjacent purer stocks both by overlap of the numerical value of the distinguishing character with an intermediate average value, and by the existence of a high proportion of specimens in which the actual width is intermediate between the normal values for the two recognized subspecies. These eighty-two specimens range in locality from Oconto County, Madison, and the Mississippi River below Prairie du Chien in Wisconsin, to Cook County, the whole length of the Illinois River, and Madison, Monroe, and St. Clair Counties, in Illinois, that is, the whole of southeastern Wisconsin, and northern and southwestern Illinois. Pearse (1923, p. 145), has already called attention to the intermediate nature of the painted turtle population at Madison, Wisconsin. Broad as it is, the area of intergradation is still relatively narrow in relation to that of the purer populations of *bellii* and *marginata*.

The identification of individual specimens from this area has naturally been a matter of great uncertainty and difficulty, since some have wide, some narrow, and some intermediate markings. If the extremes be assigned respectively to *bellii* and *marginata*, the identification of those with a moderately wide marking is not simplified, for the question as to what limiting value should be placed on this character is plainly dependent for answer on an average value for a series of specimens. Furthermore, the average rises to the westward and diminishes to the eastward, within the belt of intergradation as above determined. Specimens from the intermediate area may best be designated as "Intergrades between *bellii* and *marginata*." They should not be divided up between the two sub-

species as has recently been done by Pope and Dickinson (1928), and by Cahn (1929).

The taxonomic relations indicated are evidently those of a typical pair of subspecies, geographic forms which intergrade along their boundary. The breadth of the area of intergradation in the present case is apparently due to the absence of physical barriers of any effectiveness between the two subspecies. It is not impossible that the two forms have differentiated while isolated during the last advance of glaciation, and that their intergradation is due to intermingling and hybridization in their meeting ground on their subsequent reoccupation of the glaciated territory. Genetic experiments both with pure stocks and with stock from the area of intergradation would throw light on this question.

Burt (1928) has considered a somewhat similar problem in the case of the collared lizards, *Crotaphytus collaris collaris* and *C. c. baileyi*. He finds that the western population of this species differs from the eastern in a character of the head scales, with a reciprocal overlap in the figures for the character employed of 22 per cent and 19 per cent. The amount of this overlap would be very greatly reduced if the intermediate population, in Texas and New Mexico, were separately considered. While his conclusion that it is not useful to maintain *C. c. baileyi* as a distinct form may be justifiable, the geographic relations indicated by his study seem to present an interesting illustration of an extreme case of inter-subspecific intergradation, in which the area of intergradation is actually wider than that of the uniform populations of the two subspecies themselves. This condition may well indicate an early stage in the formation of subspecies; but there is the alternative possibility that it is due to the reamalgamation of two formerly distinct forms. In either case, the comparability of the *collaris-baileyi* problem in *Crotaphytus* with that presented by the subspecies of *Chrysemys* is evident. These several pairs of subspecies therefore indicate that the sub-specific category includes a continuous graded series of possible types of intergradation, from species which intergrade on a narrow boundary to forms in which the pure stock is confined to opposite borders of the total range, the area of intergradation occupying the greater part of the intermediate area.

*Chrysemys treleasei*, described by Hurter from specimens collected in Madison, Monroe, and St. Clair Counties, Illinois (opposite St. Louis), was distinguished, in the original diagnosis, by the red coloration of the plastron. Specimens from Monroe and St. Clair

Counties in Field Museum have red plastrons, but attentive examination shows that this is due to a superficial deposit of a red pigment (doubtless an oxide of iron). Further examination of specimens of *Chrysemys* from widely scattered localities proves that such a deposit of red pigment may take place wherever this pigment is present in the water in sufficient quantity. A few such specimens, in illustration of this fact, are described below.

F. M. N. H. No. 5937. Dune Park, Indiana. Entire shell covered with a closely adherent red deposit, more evident on the plastron, where the ground color is lighter.

F. M. N. H. No. 2852. Miller, Indiana. Red pigment on the plastron, worn off on the lateral edges.

F. M. N. H. No. 2669. St. Clair County, Illinois. Entire shell covered with red pigment, which has been worn off on the plastron except for the gular, humeral, and anal plates, and for the grooves of the growth rings on the remaining plates.

F. M. N. H. No. 14706. Clark County, Wisconsin. Red deposit on both ends of the plastron and on the carapace. In this dried shell the deposit has cracked and may easily be rubbed off.

In the specimens figured by Hurter as typical of *treleasei* (Hurter, 1911, Pl. 24) the red deposit on the plastron may be seen to be worn off along the edges of the horny plates, while it is retained in the grooves of the growth rings, where it is protected against friction during locomotion. In his description (*ibid.*, p. 235-36) he says, "In the young of the first year the red plastron is divided into squarish fields by the proportionately wide yellow sutures." This coloration is shown (Pl. 23, Fig. 3). The yellow sutures are obviously the new growth of horny shield, on which red pigment has not yet been deposited, while the squarish red fields are the primary plates (that is, the horny plates of the first year's growth), which have not yet been shed. This same figure shows that the primary right anal plate has been shed, and hence there is no red on this plate. It seems perfectly evident that the red color of the specimens on which *treleasei* was based is due to this inorganic and superficial deposit of red pigment. A similar superficial deposit of red pigment is mentioned by K. P. Schmidt as occurring on two species of Chinese turtles, *Clemmys mutica* and *Cyclemys trifasciata* (Schmidt, 1927, pp. 405-6).

Although Hurter's specimens were evidently covered with a superficial deposit of inorganic red pigment, organic red pigment commonly occurs in specimens of *bellii*, somewhat more frequently in juvenile examples than in adults. The organic red pigment differs

from the inorganic in that it is not superficial, but is found in the Malpighian layer of the skin (the layer next to the bone). About half the living specimens examined from Madison, Wisconsin, had red plastrons, with organic red pigment as described above. These are intergrades between *marginata* and *bellii*. Five out of six specimens of *bellii* from Clark County, Wisconsin, had the plastron red in life. A juvenile specimen from Miller, Indiana (typical *marginata*), had the plastron coral red (Ridgway). Thus the painted turtles with a red plastron do not seem to have any relation to geographic range, and do not form a subspecies. It may also be noted that the organic red pigment of the plastron turns yellow in alcohol, while specimens with superficial inorganic red pigment remain unchanged.

Although we have tentatively included the area assigned by Hurter to *Chrysemys treleasei* in the area of intergradation between *bellii* and *marginata*, there is a distinct approach to *bellii* in the series from lower Illinois River, Monroe County, and St. Clair County, Illinois. In order to simplify the synonymy, we accordingly propose that *C. treleasei* be placed under *bellii*. The changes from the nomenclature of the "Check List of North American Amphibians and Reptiles" (Stejneger and Barbour, 1923) involved in this arrangement and in the recognition of intergrades between *picta* and *marginata* are indicated below.

### ***Chrysemys picta picta* (Schneider).**

*Testudo picta* Schneider, Naturg. Schildkr., p. 348, 1783.

*Chrysemys picta* Gray, Cat. Shield Rept. Brit. Mus., pt. 1, p. 32 (part), 1856.

### ***Chrysemys picta bellii* (Gray).**

*Emys bellii* Gray, Syn. Rept., p. 31, 1831.

*Chrysemys marginata bellii*, Stejneger and Barbour, Check List N. Amer. Amph. and Rept., (1), p. 118, 1917.

*Chrysemys bellii bellii* Ruthven, Sci., 59, p. 340, 1924.

*Chrysemys treleasei* Hurter, Trans. Acad. Sci. St. Louis, 20, p. 235, pl. 23, fig. 3; pl. 24, 1911.

### ***Chrysemys picta marginata* (Agassiz).**

*Chrysemys marginata* Agassiz, Contr. Nat. Hist. U. S., 1, pt. 2, p. 439; 2, pl. 1, fig. 6, pl. 5, figs. 1-4, 1857.

*Chrysemys marginata marginata* Stejneger and Barbour, Check List N. Amer. Amph. and Rept., (1), p. 118, 1917.

*Chrysemys bellii marginata* Ruthven, Sci., 59, p. 340, 1924.

### ***Chrysemys picta dorsalis* (Agassiz).**

*Chrysemys dorsalis* Agassiz, Contr. Nat. Hist. U. S., 1, pt. 2, p. 440, 1857.

*Chrysemys marginata dorsalis* Stejneger and Barbour, Check List N. Amer. Amph. and Rept., (1), p. 118, 1917.

The range of *Chrysemys picta bellii* extends from the Rocky Mountains to the Mississippi River, southward to New Mexico and Texas, presumably intergrading with *C. picta dorsalis* somewhere in Louisiana, Arkansas, and Texas, westward to the Pacific coast in Washington and British Columbia, and eastward through northwestern and northern Wisconsin, upper Michigan (Ruthven, Thompson, and Claige, 1928, p. 159) and the Lake Superior drainage of the province of Ontario (Logier, 1928, pp. 290–91). This extension of what is in the main a plains species through the heavily forested area of Wisconsin, Michigan and Ontario seems explainable in part by the highway for dispersal supplied by the valley of the St. Croix and by Lake Superior itself.

The range of *Chrysemys picta marginata* extends from eastern New York through western New York and western Pennsylvania, Ohio, Indiana, and the lower peninsula of Michigan and southeastern Illinois, intergrading with *C. picta bellii* in Illinois and Wisconsin, and presumably with *C. picta dorsalis* somewhere to the south of the Ohio River, the southeastern border of its range being ill defined.

It is unfortunate that nomenclature does not indicate more perfectly actual relationships. It is probable that *picta* is an eastern and *bellii* a western derivative of *marginata*. *Chrysemys dorsalis* may more easily be derived from *marginata* through the loss of the ventral figure than from *bellii* (whose range it also touches), in which the development of the plastral marking is much more greatly emphasized.

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MACROGEOMYS UNDERWOODI sp. nov.

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TWO NEW RODENTS FROM COSTA RICA

BY

WILFRED H. OSGOOD

CURATOR, DEPARTMENT OF ZOOLOGY



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## TWO NEW RODENTS FROM COSTA RICA

BY WILFRED H. OSGOOD

Mr. C. F. Underwood, who has made so many contributions to the knowledge of the fauna of Costa Rica, has recently sent to Field Museum several small collections of mammals from that country. Due to his skill as a collector and his knowledge of local conditions gained during a long residence in Central America, he has obtained a number of interesting records as well as two undescribed rodents.

One of the new forms is a pocket gopher of quite unusual character and the other a southern representative of a little-known group of leaf-eared forest rats. They may be described as follows:

### **Macrogeomys underwoodi** sp. nov.

*Type* from Alto de Jabillo Pirris, between San Geronimo and Pozo Azul, western Costa Rica. No. 35175 Field Museum of Natural History. Adult female. Collected April 23, 1931, by C. F. Underwood. Orig. No. 406.

*Diagnosis*.—Allied to *M. cherriei* and *M. c. costaricensis* of eastern Costa Rica, but differing strikingly in the absence of white on the head and in the possession of a broad band of pure white across the lumbar region and thence less distinctly across the abdomen. Skull similar in general characters but slightly smaller with rostrum markedly narrower.

*Color*.—Upper parts including head, shoulders, and middorsal region rich, dark brown, almost blackish (nearest Vandyke Brown, but darker); rump and base of tail similar but slightly paler with a slight hoariness due to the presence of a varying number of exserted pale hairs; band across lumbar region sharply defined, 13 to 22 mm. in width, pure white to roots of hairs, passing in front of the hind legs (where it tends to be discontinuous) and spreading irregularly across the abdomen; under parts abruptly paler than the upper parts but, except in the region of self-colored white hairs, much darker than in *M. cherriei*; throat, breast, and inguinal region rather thinly haired, pale cinnamon brown lightly washed with hoary; fore and hind legs all around mainly like under parts; whiskers and a limited area at their bases whitish; tail and feet practically nude, light-colored; claws light-colored.

*Skull*.—Generally similar to that of *M. cherriei* but smaller and lighter with the rostral or naso-maxillary region conspicuously narrower; incisors weaker and narrower; maxillary toothrow shorter; nasals much compressed behind; posterior endings of premaxillaries expanded, not pointed, behind; incisive capsule of mandible more inflated than in *cherriei*; angular process of mandible weaker and less projected laterally; maxillary-squamosal union complete above jugal.

*Measurements*.—Type, measured by collector: total length 280; tail 92; hind foot (s. u.) 35. Skull of type: basal length 51.3; basilar length 44; zygomatic width 33.2; width between postorbital processes 14.7; interorbital constriction 8.9; width of rostrum in front of zygoma 10.9; length of nasals 18.2; diastema 20.9; alveolar length of upper toothrow 11.2.

*Remarks*.—The extraordinary white markings of this species are attested by three specimens in which there is but slight variation. They consist of the type which is a full-grown adult female, a sub-adult female of nearly the same size, and a half-grown young, also female. In the type, the white belt is continuous on the right side, but is slightly interrupted on the left in the vicinity of the boundary between the upper and lower parts where it is reduced to a few scattered white hairs. In the second female there is similar interruption on both sides, and in the young the white band completely encircles the body. It seems highly improbable, therefore, that the marking is abnormal.

A smaller white area, in this case on the top of the head, is found in *M. cherriei*, *M. c. costaricensis* and *M. matagalpae* and is quite symmetrical in a number of specimens from different localities. The occurrence of definite areas of white may thus be regarded as one of the evidences of affinity between these forms and *underwoodi*. Disregarding the white, however, the new form is easily distinguishable from *cherriei* by its general color and cranial characters. *M. cherriei* is represented in Field Museum by two specimens from Jimenez. The type of *cherriei* was from Santa Clara and that of *costaricensis*, which does not differ in color, was from Pacuare. All these localities are in eastern Costa Rica well removed from the region occupied in the west by *underwoodi*. *M. matagalpae* of Nicaragua, still farther away, also belongs to the group with a white crown patch. Mr. Underwood designates the exact situation of Alto de Jabillo as "a little *viñenda* of some half dozen shack houses between San Geronimo and Pozo Azul. From this spot a beautiful view is

secured of the Rio Grande de Pirris below and farther the Llanuras de Pirris, and beyond, the sea coast."

**Ototylomys phyllotis australis** subsp. nov.

*Type* from San Geronimo, near Pozo Azul de Pirris, western Costa Rica. No. 35177 Field Museum of Natural History. Sub-adult male. Collected April 17, 1931, by C. F. Underwood. Orig. No. 313.

*Diagnosis.*— Similar in color to *O. guatemalae* and *O. fumeus*; tail about equal to or shorter than head and body; skull similar, but audital bullae smaller actually and relatively; teeth slightly smaller.

*Color.*—Upper parts dull Hair Brown; sides of body between flanks and shoulders with hairs tipped with grayish white mixed with brownish; under parts and inner sides of legs pure white to roots of hairs.

*Measurements.* —Type, measured by collector: total length 242; head and body 123; tail 119; hind foot 26; ear 21. Skull of type: basal length 32; zygomatic width 18.2; mastoid width 13.5; inter-orbital constriction 6.5; diastema 9.1; length of audital bulla 5.5; upper toothrow 6.8.

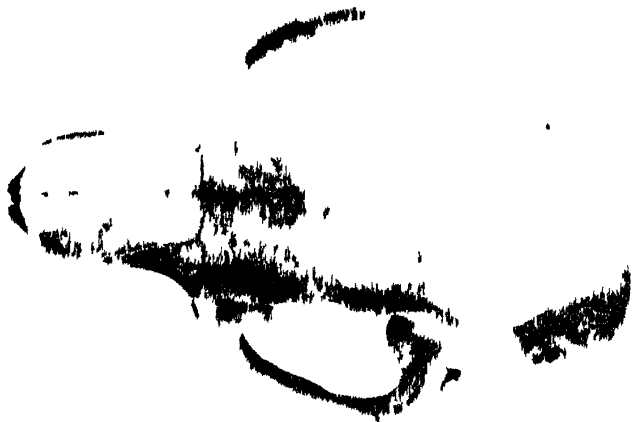
*Remarks.*— This is probably a slight form closely related to *fumeus*, *guatemalae* and *phyllotis*, all of which seem to belong in one series distinguished from each other by characters usually of no more than subspecific importance. The light area on the sides shown in the single Costa Rican specimen is not present in a specimen of *guatemalae* from Honduras with which it has been compared, but without a series showing variations in pelage, its importance is difficult to estimate. At present, therefore, the principal distinction of the new form is the reduced size of its audital bullae.

In the type and only specimen the skin of the upper side of the hind feet has been largely destroyed by ants, but what remains seems to indicate that the feet may be lighter-colored than in the northern forms. Specimens of *O. fumeus* kindly loaned by the American Museum of Natural History show that form to be much larger.

San Geronimo is "some half hour's walk before descending to Pozo Azul de Pirris" and "about 1,000 feet higher than the Rio Grande." Mr. Underwood's headquarters here were at the hacienda of Don Roberto Wille within a dozen miles of the Pacific Ocean.



Adult male



Adult female

SKULLS OF *DINOMYS BRANICKII* FROM PERU  
About two thirds natural size

FIELD MUSEUM OF NATURAL HISTORY

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# NOTES ON DINOMYS

BY

COLIN CAMPBELL SANBORN

ASSISTANT CURATOR OF MAMMALS

WILFRED H. OSGOOD

CURATOR, DEPARTMENT OF ZOOLOGY

EDITOR



CHICAGO, U. S. A.

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## NOTES ON DINOMYS

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BY COLIN CAMPBELL SANBORN

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The genus *Dinomys* with one species, *D. branickii*, was described by Peters in 1873 from a specimen collected by Jelski in the Montana de Vitoc, Colonia Amable Maria, in the Andes of central Peru. Since then, about fifteen other specimens of the genus have been recorded from Ecuador, Colombia, and the upper Rio Purus in Brazil, but no others from Peru. This material has been the basis for the descriptions of three new species, all characterized by skin differences.

Field Museum has a series of twenty-four specimens secured by Mr. Edmund Heller on the Marshall Field Peruvian Expedition of 1922-23. The majority of these are from the haciendas Buena Vista and Vista Alegre on the Rio Chinchao, and from Pozuzo—points a short distance north of the type locality. One was bought in Manaos, Brazil. All the specimens were purchased from natives, so very few are perfect in every detail. The series consists of four skins with skulls, five skins only, and fifteen skulls only.

Of the nine skins in the series but one is complete; two have heads, feet, and part of the tail; four have heads but no tails or feet; and two have no heads, tails, or feet. Four are sexed as males and two as females. Six of the skins are black and three are brown, one of the latter being the one purchased in Manaos. One of the brown skins is sexed as a male.

The skins differ mainly in the number of white and half white hairs. In some cases the sides are very white and the four dorsal lines heavy and almost continuous, while in others the white hairs are very scattered and the dorsal lines are narrow and broken. Apparently the older the animal, the more white and the heavier and more complete the dorsal lines. In all the specimens the two outer lines are heavier and longer. In some the inner pair start from three to ten inches farther down the back than the outer pair. The only complete skin has a head and body of 730 mm. and a tail of 190 mm. The head and body measurements on the other skins range from 730 to 790 mm.

Of the nineteen skulls, two are so badly broken as to be of little use. The other seventeen fall into three age groups: four males and

two females, very old, the basioccipital, basisphenoid, and presphenoid bones being fully ankylosed; two males and five females, subadult, the basisphenoid-presphenoid suture being still open; four in various stages of immaturity. Of these, but seven have mandibles.

The type skull illustrated by Peters is subadult, as the basioccipital, basisphenoid, and presphenoid sutures are still open. This young male skull is nearly the same size as the old female measured by Preller and the old female (type of *occidentalis*) measured by Lönnberg. It is plain then, if a young male is the same size as an old female, that when a male is fully adult it will be much larger than a female and it is on this basis that I have sexed the skulls in the series before me.

The nasal bones show more individual variation than any other part of the skull. In the two of four old males in which these bones are present, they measure  $52.2 \times 31.8$  and  $50 \times 28$  mm. respectively. In another specimen the estimated width is 27.5 mm. In the two old females the nasals measure  $49.3 \times 26.8$  and  $42 \times 22.3$  mm. The subadult specimens show about the same variation. The general form of the nasals is the same in all the specimens; they broaden anteriorly for about half their length and then narrow posteriorly where the ends form a concave, parallel, or, sometimes, a convex line. The concave formation seems to be the most common. The broadest part of the nasals is always in the region of a pair of small nasal foramina on the sides of the nasals, which appear in all the eleven specimens which have these bones.

In all the females the lateral edges of the frontals are nearly parallel. In the males the frontals are expanded anteriorly and contracted posteriorly, the edges are roughened, and there is a short postorbital process, much more developed in some than in others.

In the parietals the skulls again show an individual variation which can not be attributed to age. In all, the parietals begin to expand just back of their anterior margin and to contract just forward of their posterior margin. In some this forms two converging lines, but in others the expansion and contraction is carried so far as to form two wide curves, the left hand side almost forming the letter "S." The curves are more uniform in the females and reach their greatest development in the old males. In a subadult male they are hardly noticeable while in a very young skull they are highly developed.

The jugal bones in all the skulls vary greatly in width, especially anteriorly. The size of the lachrymal bone is not constant either

and in one skull the top of the jugal almost touches the lower end of the lachrymal. The width of the maxilla between the jugal and lachrymal is also variable. In the six male skulls it ranges from 5 to 8.5 mm. This width does not seem to be governed by the size of the jugal or lachrymal. The female skulls show the same variation in these bones.

In other parts the skulls are fairly uniform. The skull of an old female is slightly abnormal, due, perhaps, to a birth injury. A view of the palatal aspect seen from above shows the palate swinging to the right, one bulla sunken, and in other parts the skull decidedly off center. The type skull of *branickii* has an abnormality shown by the Wormian bone between the parietals and the frontals. In a subadult female in this series, the suture between the parietals and frontals, instead of being a straight or gently curved line, has a very marked concavity, some 5 mm. deep in its center, which might indicate a possible tendency toward a Wormian formation.

The first specimens of *Dinomys* captured since the discovery of the type, came from the upper Rio Purus in Brazil and were sent to Goeldi at Para. These were a live adult female and a young male, brown in color, which Goeldi identified as *branickii* (Goeldi, 1904). A description of the skulls of these two specimens was published with photographs of them a few years later (Preller, 1907).

In 1919 Ribeiro described *Dinomys pacarana* from Brazil, which differed from *branickii* in being brown instead of black. At that time Peters' type was the only black specimen known but since then both colors have been found in animals from the same region. Lönnberg had a black male and a brown female from Ecuador and both colors are represented in the Field Museum series. The type of *pacarana*, which is a subadult male, has a head and body of 630 mm. and a tail of 140 mm. The type "procedente do Amazonas" probably came from the Rio Purus region.

*Dinomys branickii occidentalis* was described from near Gualea, Ecuador, by Lönnberg in 1921. It was said to differ from *branickii* in having a shorter tail, which was but 27.5 per cent of the head and body as opposed to 37.6 per cent in *branickii*. The author stated that this might be individual variation and it would appear that it is as the tail of the complete skin in the Field Museum series is 26 per cent of the head and body and the tail of the type of *pacarana* is only 22.2 per cent. There were no skull characters given and in size the skull is the same as *branickii*. The skin and skull of a subadult topotype show no differences from the Peruvian series.

In the same year Anthony described *D. gigas* from La Candela, Huila, Colombia, from a flat native skin without skull. This skin, which was stated to be stretched, had a head and body of 750 mm. and was supposed to be twice the size of either *branickii* or *occidentalis*. The Field Museum series of *branickii* contains specimens of this size and larger. The other character attributed to *gigas* is found in the four dorsal stripes which are continuous and not broken as in other known specimens. One specimen from Peru closely approaches the type of *gigas* as the dorsal lines have but two very slight breaks in them due to wear. The examination of the type of *gigas* shows it to be a very large, fully pelaged, and unworn specimen which accounts for the continuous lines.

In 1923 Niceforo described a specimen from the Sierra Santa Elena, near Medellin, Colombia, in which the spots and lines were clear yellow instead of white. A young specimen born in the New York Zoological Gardens has the spots and lines a brownish yellow, and in another specimen, which is a little older, they are a dirty white. The measurements which Niceforo gives for the skull agree closely with those of a very young skull in the Peruvian series. The dorsal lines in this Colombian specimen are broken and not continuous as in the type of *gigas*.

The series of undoubted *branickii* thus shows variations largely covering the characters assigned to other named forms. Brown color, short tail, size, and unbroken dorsal lines are seen to have no value as racial characters. The chance that more material from Colombia will show any stronger characters for *D. gigas*, in view of the great individual variation in the Peruvian series, seems to me very slight.

The status of the forms of *Dinomys* may be summarized as follows:

#### ***Dinomys branickii* Peters.**

*Dinomys branickii* Peters, Monatsber. Akad. Wiss. Berlin, pp. 551-552, 1873; Festschr. Gesellsch. naturf. Fr. Berlin, pp. 227-234, pls. 1-4, 1873—Colonia Amable Maria, Montana de Vitoc, Andes of central Peru.

*Dinomys pacarana* Ribeiro, Archivos de Escola Superior de Agricultura e Medicina Veterinaria, 2, pp. 13-15, 1919—Amazonas, Brazil.

*Dinomys branickii occidentalis* Lonnberg, Arkiv. for Zoologi, 14, pp. 49-53, 1921—Gualea, Ecuador.

*Dinomys gigas* Anthony, Amer. Mus. Novit., No. 19, pp. 6-7, 1921—La Candela, Huila, Colombia.

*Dinomys* sp., Niceforo, Bol. Soc. Colombiana Cien. Nat., pp. 317-320, 1923—Sierra Santa Elena, Colombia.

*Range*.—Andes Mountains from central Colombia through Ecuador to central Peru, and east to the Rio Purus region of Brazil.

I wish to thank Mr. H. E. Anthony for the loan of the American Museum material, including the type of *gigas* and a topotype of *occidentalis*, and also for the description of Niceforo's specimen which Mr. Anthony copied for me.

Mr. Heller kindly sent me the history of the specimens which he collected and some notes on the habits of the animal, which are as follows:

"The natives in the Huallaga River headwaters such as the coca haciendas of Buena Vista and Vista Alegre have the unusual habit of saving the skulls of all their larger game animals. The skulls I obtained from the cabins or huts where the hunters lived. The skulls are kept together in long strings tied to the ceiling over a smoky fire to keep the blow-flies away. The skulls often are as black as if they came from the La Brea tar pits of California. The hunters from whom I secured the skulls were in some cases Indians who worked on the haciendas and in other cases they were Mestizos from the highlands who had worked in the coca fields of the montana. They all believed that it was good luck to keep the skulls of their game as this custom was sure to cast a favorable spell over them and make it much easier to secure more game of the same sort in their future hunting trips.

"*Dinomys* (Terrible Mouse) is not a fighter but merely fights as a last resort to save its life. It is slow in motion and can not turn about quickly, therefore it has no rear protection from alert foes like ocelots, tayras, coatis, etc. It therefore lives in rocky cliffs, or holes in the ground by preference, where it can back up and secure rear protection. With its large teeth it can fight any ordinary enemy. Dogs are used to trail *Dinomys* I believe. Although I spent several months in *Dinomys* territory and was taken by local guides to cliffs where *Dinomys* had been secured, I never met one of these rare rodents nor did I ever find a burrow or little cave where they had recently lived.

"My pet *Dinomys* followed me closely everywhere I went and at night slept under my bed. She had a firm belief that her safety lay in keeping at my heels. She had no home feeling for any cabin we occupied. When alone she was always worried and full of fear apparently."

This pet was brought home by Mr. Heller and placed in a Chicago zoo, but on its death was not preserved.

MEASUREMENTS OF DINOMYS SKULLS IN FIELD MUSEUM OF NATURAL HISTORY

Field Museum Number	Age	Sex	Greatest length	Condyllo-basal length	Length of palate	Length of nasals	Breadth of nasals	Length of frontals	Length of parietals	Breadth across rostrum	Interorbital breadth	Zygomatic breadth	Length of mandible	Coronoid height of mandible	Upper tooth row, alveolar length	Crown of first m.
24284	adult	M	153.3	140.0	46.7	50.0	28.0	60.0	46.6	34.5	46.8	90.0	109.0*	58.3	38.0	7.4
24282	adult	M	151.0*	—	45.9	—	28.3	57.4	—	35.0*	49.0	92.0	—	—	35.4	6.9
34407	adult	M	154.0*	—	48.0	—	27.5	56.7	—	35.7	44.3	91.5	111.0	52.4	34.3	6.7
34404	adult	M	153.3	139.5	46.0	52.2	31.8	54.0	46.5	38.8	45.8	—	—	—	34.0	7.0
34403	adult	F	144.7	129.7	44.0	49.3	26.8	50.6	46.0	33.7	46.0	—	—	—	31.7	6.4
34702	adult	F	138.0	122.0*	43.3	42.0	22.3	48.1	45.8	28.5	38.0	82.3	—	—	33.0	6.0
34233	sub-ad	M	151.6	137.4	44.0	53.0	26.4	56.4	44.0	32.6	45.6	90.5	109.0	54.3	36.0	7.0
34415	sub-ad	M	149.0	139.3	46.0	—	27.3	53.0	44.0	32.0	45.5	89.4	—	—	34.0	—
34416	sub-ad	F	141.7	125.0*	40.0	—	22.8	51.0	48.3	29.3	39.7	81.3	—	—	31.8	6.0
34409	sub-ad	F	141.2	124.7	42.8	45.8	24.1	50.0	47.7	28.5	39.7	80.5	—	—	35.6	6.4
34411	sub-ad	F	139.0	122.0*	40.8	44.0	24.8	46.0	44.4	28.0	38.6	85.0	102.2	45.2	34.6	6.5
34414	sub-ad	F	133.0	122.3	41.0	49.0	26.3	43.5	42.7	29.7	44.0	88.4	100.5	41.6	31.0	6.9
34417	sub-ad	F	133.4	123.4	40.0	44.4	23.3	44.7	49.2	28.6	41.0	—	—	—	30.6	6.5
34410	immature	F	130.0	118.5	37.6	43.0	21.4	47.8	43.5	27.2	35.9	77.7	—	—	28.8	6.0
34405	immature	—	115.7	105.4	35.8	—	—	40.0	41.2	—	—	—	—	—	26.5	—
34412	immature	—	109.0	—	31.6	—	18.3	39.4	41.6	22.9	33.0	64.2	—	—	26.4	—
34413	immature	—	104.5	—	28.8	30.0*	19.0	36.7	40.0	21.6	31.4	67.8	—	—	26.3	—

\*Measurements marked with an asterisk are approximate.

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REPTILES AND AMPHIBIANS  
OF THE  
MANDEL VENEZUELAN EXPEDITION

BY

KARL P. SCHMIDT

ASSISTANT CURATOR OF REPTILES

WILFRED H. OSGOOD

CURATOR, DEPARTMENT OF ZOOLOGY

EDITOR



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JUNE 16, 1932

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# REPTILES AND AMPHIBIANS OF THE MANDEL VENEZUELAN EXPEDITION

— — —  
BY KARL P. SCHMIDT

Thanks to the interest of Messrs. Leon Mandel II and Fred L. Mandel, Jr., Mr. Emmet R. Blake, field collector for the Mandel Venezuelan Expedition, was enabled to continue work in Venezuela after the return of the yacht *Buccaneer*, which carried the expedition from Miami to the Orinoco. Mr. Blake's principal objective during this period was Mount Turumiquire, the most eastern outpost of the Venezuelan Andes in the Department of Sucre. While Mr. Blake's primary interest was in the collecting of birds, he preserved ninety-two specimens of reptiles and amphibians. These prove to represent twenty-four species of which no less than nine are new to Field Museum's collections, while two are new to science. The new frog has been named *Phyllobates mandelorum*, in honor of Messrs. Mandel, and the new lizard, *Anadia blakei*, associates Mr. Blake's name with the Mount Turumiquire fauna, to the knowledge of which he has made an effective contribution.

## AMPHIBIA

### ***Bufo marinus marinus* (Linnaeus).**

An adult from Cumana and one from Cumanacoa represent the typical northern form of *Bufo marinus*, which lacks the elongate tibial gland characteristic of specimens from southern Brazil. Three freshly transformed individuals were collected at Cocollar, at an altitude of 3,600 feet.

### ***Leptodactylus bolivianus* Boulenger.**

Three specimens from Cocollar.

### ***Eleutherodactylus gollmeri* (Peters).**

Nine specimens, six from an altitude of 6,000 feet and three from 8,000 feet on Mount Turumiquire. Identification of these specimens is provisional, requiring check against topotypes from Caracas.

### ***Eleutherodactylus bicuimulus* (Peters).**

One specimen from altitude of 6,000 feet on Mount Turumiquire. This identification also requires checking against the type or topotypical material.

**Pleurodema brachyops** (Cope).

One specimen from Cocollar.

**Hyla crepitans** Wied.

Two specimens from Cocollar.

**Phyllobates trinitatis** Garman.

Ten specimens from an altitude of 5,000 feet on Mount Turumiquire.

**Phyllobates mandelorum** sp. nov.

*Type* from camp at altitude of 8,000 feet on Mount Turumiquire, Venezuela. No. 17788 Field Museum of Natural History. Collected March 7, 1932, by E. R. Blake.

*Diagnosis*.—No flash coloration; skin smooth; ventral surface light with large dark spots; no transverse bar on chest; first finger shorter than second; tympanum obscure; a broad irregular dark vertebral band on the light ground color of the back. Distinguished from *P. trinitatis* by its dorsal and ventral coloration and from *P. kingsburyi* by coloration and indistinct tympanum.

*Description of type*.—Snout rounded, as long as the longest diameter of the eye; nostrils near its tip; body stout, tibio-tarsal joint of the hind leg extended along the body reaching the eye.

Skin smooth above and below; tympanum close to the eye, only its anterior border distinguishable; first finger shorter than second; disks small, those of fingers slightly larger than those of toes; outer and inner metatarsal tubercles present, small.

Dorsum, including top of head, greenish silvery, sharply distinct from the chocolate-colored sides; a dark irregular vertebral band of the same color as the sides begins with an expansion between the eyes and extends nearly to the hind limbs; this band widens and encloses a light spot opposite the shoulders; the dark color of the sides extends around the snout; a silvery band on the upper jaw connects with the same color on the upper arm; border of upper jaw dark; a light line extends forward from the groin in the dark lateral band; anterior face of thighs with a lengthwise dark band, which is not reached by the broad dark bars of the upper and posterior surfaces; tibia barred; ventral surfaces light with obscure darker spots, with no trace of the dark band across the chest which characterizes *Phyllobates trinitatis*.

*Measurements.*—Length of body 26 mm.; greatest width of head 8.5 mm.; arm 17 mm.; leg 38.5 mm.

*Notes on paratype.*—The single paratype, F.M.N.H. No. 17789, from the same locality as the type, is in excellent agreement with the above description.

***Rana palmipes* Spix.**

Three specimens from Cumanacoa.

REPTILIA

***Anolis chrysolepis* Duméril and Bibron.**

One specimen from Cocollar.

***Polychrus marmoratus* (Linnaeus).**

Three specimens from Cocollar.

***Tropidurus torquatus hispidus* (Spix).**

Four specimens from Cocollar.

***Ameiva ameiva melanocephala* Barbour and Noble.**

Two specimens from Cumanacoa are topotypes of this well-characterized subspecies, and four more were collected at Cocollar.

***Cnemidophorus lemniscatus lemniscatus* (Linnaeus).**

Eight specimens from Cumanacoa and eight from Cocollar.

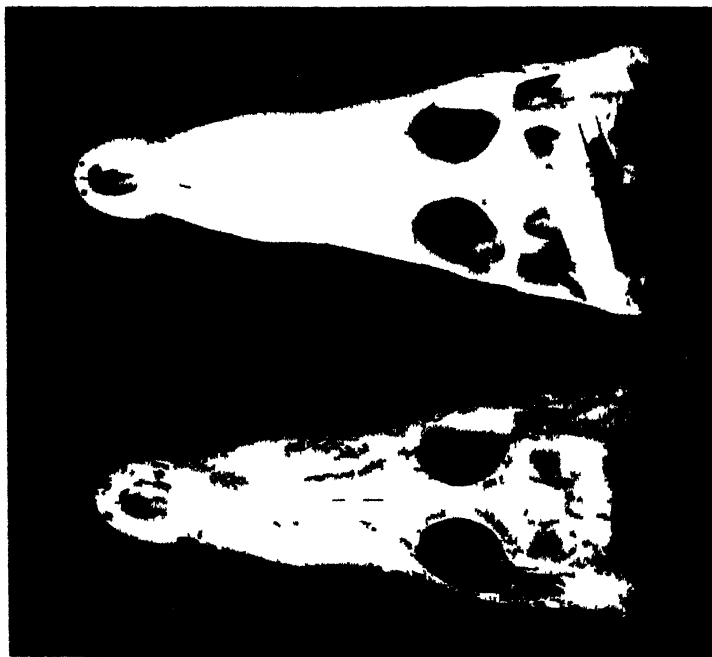
***Anadia blakei* sp. nov.**

*Type* from camp at altitude of 5,000 feet on Mount Turumiquire, Venezuela. No. 17795 Field Museum of Natural History. Adult female. Collected March 10, 1932, by E. R. Blake.

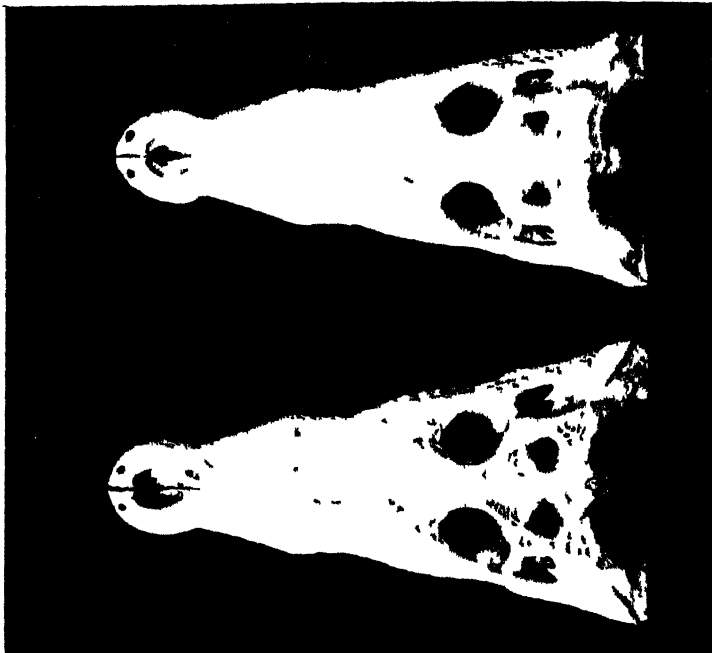
*Diagnosis.*—Allied to *Anadia bitaeniata* in character of head shields, but distinguished by the lower number of scales around the body and of transverse rows of dorsals; four supraoculars; twenty-eight scales around the body; thirty-three to thirty-four from the occipitals to the second postanal row.

*Description of type.*—An *Anadia* with slender snout, stout body, and limbs slightly overlapping when adpressed.

Frontonasal longer than broad; prefrontals forming a short median suture; four supraoculars, the first smallest, fused with the adjacent supraciliary on one side; frontal six-sided, larger than the



*C. porosus*  
No. 14038 (159 mm.)



*C. notae guineae*  
No. 14016 (167 mm.)

JUVENILE AND ADULT SKULLS OF NLW GUINEAN CROCODILES

*C. jorasi*  
No. 11031 (31 mm.)

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# NOTES ON NEW GUINEAN CROCODILES

BY

KARL P. SCHMIDT

ASSISTANT CURATOR OF REPTILES

REPORTS ON RESULTS OF  
THE CRANE PACIFIC EXPEDITION

WILFRED H OSGOOD

CURATOR, DEPARTMENT OF ZOOLOGY

EDITOR



CHICAGO, U. S. A.

JUNE 16, 1932



In addition to this New Guinean material, the expedition obtained fifteen crocodile skulls from the neighborhood of Sandakan, British North Borneo, owing to the kind interest of Mr. D. D. Wood, Director of Forestry at the time of our visit. These skulls range in length from 105 mm. to 379 mm. Other material in Field Museum from the Oriental region includes a large skull from India, two skulls and one skin from the Philippines, and a skull fragment from the Solomon Islands. Correspondence with Dr. Malcolm A. Smith, at the British Museum, secured the loan of the two skulls from Siam, mentioned by him in referring *novae-guineae* to the synonymy of *porosus* (1931, p. 44). An additional skull from New Guinea (B.M. No. 86.5.20.1) and one from the Solomon Islands were also borrowed from this source.

From all sources, more than sixty skulls have been examined. These fall perfectly into two distinct series, one corresponding to *Crocodylus porosus*, with expanded palato-pterygoid passage, which includes the Solomon Island, Philippine, Bornean, Siamese, and Indian specimens, with twenty from New Guinea; while the other, with sixteen skulls of assorted sizes, all from New Guinea, represents *C. novae-guineae* with its slender, unexpanded palatines. Thus I am prepared, from cursory examination of this enlarged material, to reaffirm the existence of two species of crocodile in New Guinea. The principal differences are in the following characters:

	<i>C. porosus</i>	<i>C. novae-guineae</i>
Nasal passage	palato-pterygoid inflation	no inflation
Palatines	widened posteriorly	not widened posteriorly
Internal nares	posterior	inferior
Quadratojugals	constricted, narrow	parallel-sided, broad
Preorbital ridge	longitudinal, sharp	more transverse, blunt
Occipital scutes	absent	present
Cranial table	subrectangular to trapezoidal	trapezoidal

Detailed measurements of all the skulls available show clearly that the proportions of the skull regarded as characteristic of *novae-guineae* in the original description do not hold. If all measurements be reduced to a proportion with reference to the length from tip of snout to occipital, the greatest width of the skull varies from .44 to .58 in *novae-guineae* and from .41 to .63 in *porosus*; the width at the tenth tooth varies from .21 to .29 in *novae-guineae* and from .24 to .34 in *porosus*. The form of the cranial table is subrectangular in juvenile *porosus*, clearly trapezoidal in young *novae-guineae*; but this character also fails in larger specimens. There are distinctive differences in the proportionate measurements of almost every skull

element, but these are masked by individual variation and by changes with growth.

*External characters.*—The two juvenile, alcoholic specimens, F.M.N.H. No. 13965 from Bien, below Marienberg, and No. 14080 from Marienberg, are referred to *novae-guineae* after examination of the palatines (by raising a flap of the palate) and on account of

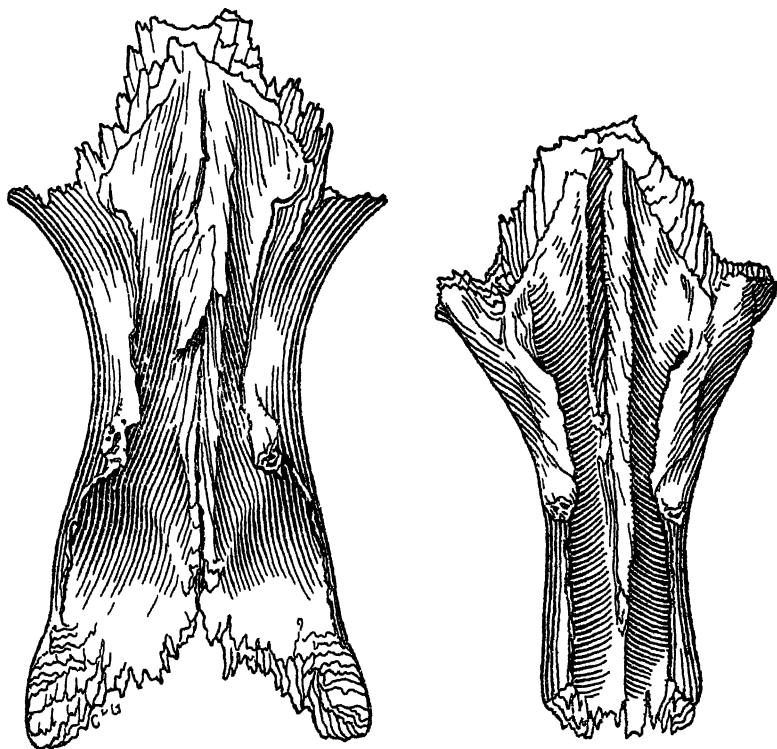


FIG. 28 Dissociated palatine bones of New Guinean crocodiles, viewed from above. Inflation of internal nasal passage shown in left figure (No. 14032, *C. porosus*), lack of inflation in right figure (No. 14039, *C. novae-guineae*)

the trapezoidal cranial table. These specimens both have the four well-developed occipital scutes, which are described as usually absent in *C. porosus*, normally present in all other species of crocodiles. The nuchals are 4-2 in both. The dorsal shield is composed of ten longitudinal rows of scutes and seventeen transverse rows in No. 13965, and of eight longitudinal and seventeen transverse rows in No. 14080. Both specimens have eighteen caudal verticils double-crested and about twenty single-crested.

The total length of No. 13965 is 345 mm.; the tail from the anterior border of the anus measures 181 mm.; the fore limb from axilla to tip of claw is 50 mm. in length; and the hind limb measures 72 mm. The same measurements in the second specimen are 605; 312; 82; and 115.

The smaller specimen is brown above with about six transverse, dark cross-bands on the back and eleven on the tail; the larger is olive, with similar dark markings.

*The palatine character.*—The most conspicuous difference between the two series of skulls examined lies in the form of the palatine bones and the connecting portions of the pterygoid. In *porosus* there is a well-marked inflation of the nasal passage at the base of the palatines, which involves a widening of these bones and a thinning out of the palatine and pterygoid walls of the passage. No such bulb in the nasal passage is developed in *novae-guineae*. The dissociated palatine bones from skulls of subequal size of the two species, viewed from above, are shown in the figure on page 169. An unexpected character of the antero-lateral projections of the palatines of *novae-guineae*, which are relatively massive, is the presence in them of a pair of large diverticula opening into the longitudinal nasal passage. These are without distinct analogues in the palatines of *porosus*.

The palatine bulb is distinctly an age character, reaching its maximum development in large skulls. Comparison of juvenile with mature skulls of *porosus* might lead to the suspicion that the inflation is absent. Direct comparison of juvenile skulls of *novae-guineae* with specimens of similar size of *porosus*, however, shows that it is possible to distinguish a relative enlargement and thinning of the pterygoid-palatine tube even in the smallest specimens, and that the widening and forking of the base of the palatines is diagnostic.

In casting about for an explanation or a possible function for this inflation of the air passages of *porosus*, the best suggestion I am able to make is that it might be a resonance chamber; and with the frequent greater development of voice in males than in females of various animals, this suggests that the difference in this character between the two series of skulls examined is one of sex. This suggestion seems to be completely negatived, however, by the existence of the other distinctive characters which do not seem to have any direct association with the nasal bulb or with sex. Furthermore, the chance (1 to 32,768) that the series of fifteen Bornean specimens should all be males, is exceedingly remote; these specimens are

uniformly and characteristically *porosus*, and they were chosen at random to form a graded series in size. No sex dimorphism of this nature has been described in any other species of crocodile, and, if the skulls of females appear in about normal proportions in collections from New Guinea, they should be equally well-known from India, Siam, Borneo, and other parts of the range of this well-known species. The inflation of the nasal passage may, nevertheless, have some relation to voice; but the attractively simple explanation of *novae-guineae* as the female of *porosus* is untenable as an interpretation of the available data.

*Other skull characters.*—The peculiar character of the internal narial opening in the skull of *porosus*, which opens obliquely downward and backward, instead of downward (with reference to the plane of the pterygoid surfaces), as in other crocodiles, has been emphasized by Mook (1921, p. 187). Since *C. novae-guineae* agrees with the majority of the species of crocodiles in this character, it is unspecialized as compared with *porosus*.

The preorbital ridge, which is highly characteristic of *C. porosus*, is indicated in *novae-guineae* by a much shorter, more blunt, and more oblique ridge, not extending to the maxillaries. After a small series of skulls has been compared with reference to this feature, it may be used as a sight character for separating the skulls of the two species. The ridge overlies the naso-lacrymal duct, which is larger in *porosus* than in *novae-guineae*.

The quadratojugals are normally much narrowed anteriorly in *porosus*, wider and parallel-sided in *novae-guineae*. The single exception noted in this character is in a skull of *porosus* (i.e., with large palato-pterygoid bulb) from the Solomon Islands, loaned for study by the British Museum in this connection.

The difference in the form of the cranial table appears to be a constant character when skulls of approximately equal sizes are compared; the more trapezoidal form of this part of the skull in *novae-guineae* is well shown in the accompanying plates. The species may be recognized by the form of the preorbital ridge and the shape of the cranial table, which are as well visible in the flesh as in the cleaned skull; and by the presence of occipital scutes.

*Distribution.*—Dr. Albert B. Lewis, well-known authority on Melanesian ethnology, has called my attention to the remarks on crocodiles in New Guinea by Mr. C. A. W. Monckton, in *Some Experiences of a New Guinea Resident Magistrate*. He writes (p.

272): "In New Guinea there appear to be two different species of the brute, for in some rivers they are small and innocuous while in others they are large and of extreme ferocity." Mr. George Murray, Director of Agriculture of the Territory of New Guinea, recalled in conversation with me during the Crane Pacific Expedition's stay at Rabaul that his Papuan work boys, in the interior of Papua, had distinguished two species of crocodile, referring to one as harmless and to the other as a man-eater.

My original supposition that *porosus* would be found to be estuarine and *novae-guineae* a strictly fresh-water species in the Sepik River proves unfounded, for our large specimen of *porosus* was shot above Magendo, 65 miles from the river mouth, and a large skull was measured at Malu, nearly 250 miles from the sea. I still suspect that the habitats of the two species are more or less exclusive, *porosus* being the species of the large open rivers, *novae-guineae* of the marshes; but direct observations are required to solve this question.

The skull mentioned above as part of the decoration of a ceremonial shield (on exhibition in Field Museum) comes from Goari Bari, Kerewa District, on the Papuan Gulf. It is a typical *novae-guineae*. This, in connection with Monckton's and Murray's accounts, contributes to the supposition that *C. novae-guineae* has a wide range in New Guinea.

Much remains to be done to clear up the relations of the two New Guinean species of crocodiles, as to their distribution, habits, and external characters; but it seems clear that there *are* two species, and that one of these is unspecialized as compared with the other more widely ranging form.

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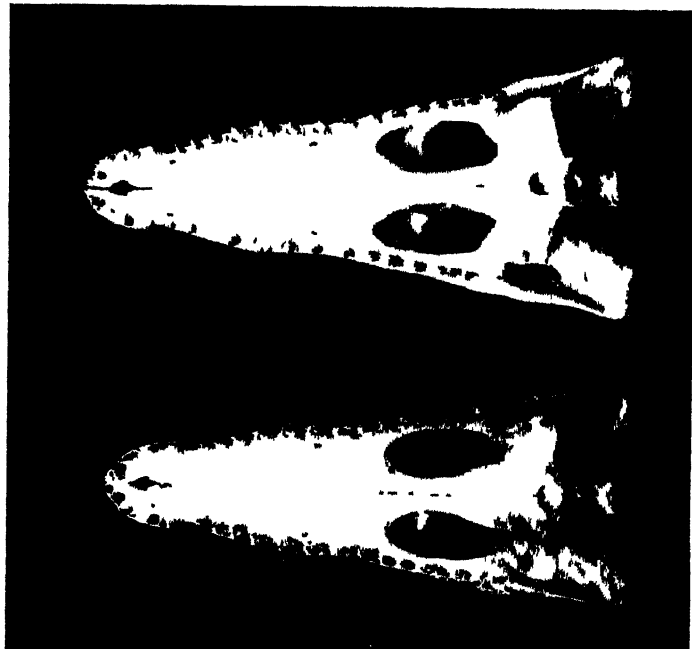
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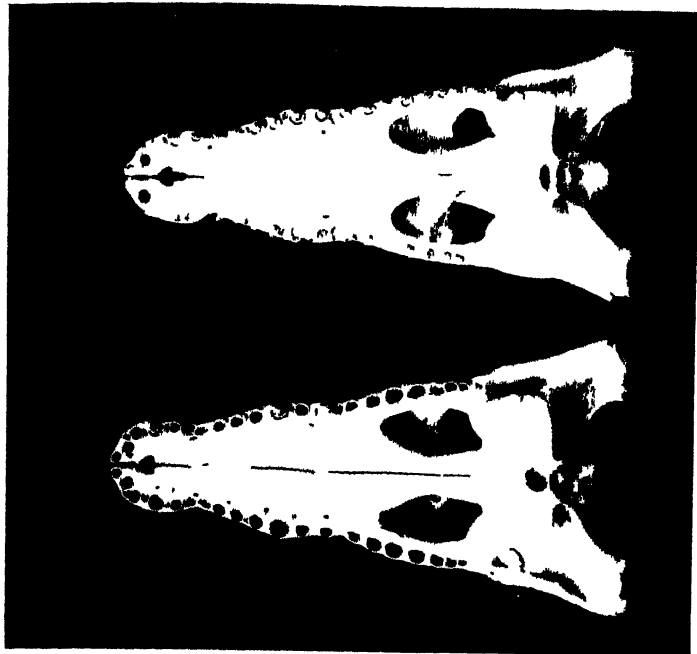
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*C. porosus*  
No. 14018 (159 mm)

*C. noronhai*  
No. 14016 (167 mm)

JUVENILE AND ADULT SKULLS OF NEW GUINEAN CROCODYLES



*C. noronhai*  
No. 14019 (355 mm)

*C. porosus*  
No. 14031 (345 mm)



*Emeia flaxioides*



*Splenonomorphus hyndli*



*Splenonomorphus cranci*

TYPES OF NEW SPECIES OF LIZARDS  
Natural size

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REPTILES AND AMPHIBIANS FROM  
THE SOLOMON ISLANDS

BY

KARL P. SCHMIDT

ASSISTANT CURATOR OF REPTILES

REPORTS ON RESULTS OF  
THE CRANE PACIFIC EXPEDITION

WILFRED H. OSGOOD

CURATOR, DEPARTMENT OF ZOOLOGY



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# REPTILES AND AMPHIBIANS FROM THE SOLOMON ISLANDS

BY KARL P. SCHMIDT

The Crane Pacific Expedition of Field Museum of Natural History, sailing in the brigantine yacht *Illyria*, belonging to Mr. Cornelius Crane of Ipswich, Massachusetts, spent twelve days in the Solomon Islands, from April 10 to April 22, 1929. Collections made on the islands of Ugi, Tulagi, Malaita, Ysabel, Kulambangra, and New Georgia include seven additions to the herpetological fauna of the archipelago, which was reviewed by Mr. J. R. Kinghorn in 1928.

The Solomon Islands have been a center of herpetological interest since the remarkable character of their reptiles and amphibians became known in the 1880's through G. A. Boulenger's descriptions of the collections made by Guppy and Woodford. New and remarkable forms continue to be discovered, and numerous titles can already be added to Kinghorn's bibliography. Subsequent to his summary of the fauna in 1928, two species of the lizard genus *Tribolonotus* were described by Dr. Charles E. Burt, and one of these was later made the type of a new genus by Dr. Jean Roux of Basel, Switzerland. A joint paper by Dr. Burt and myself describes a new skink from the New Hebrides, and records it from the Solomons also. Burt's preliminary descriptions of new forms from the collections made by the Whitney South Sea Expedition will be amplified in a catalogue of the amphibians and reptiles of the Pacific islands represented in the collections of the American Museum of Natural History.

The wealth of the Solomon Island fauna in other groups of vertebrates is illustrated by the paper by Mr. Colin C. Sanborn on the bats collected by the Crane Pacific Expedition (Field Mus. Nat. Hist., Zool. Ser., 18, No. 2, 1931). The interiors and higher altitudes of the larger islands are still very little known, and further additions to the fauna may be expected.

The Crane Pacific Expedition is greatly indebted to the local officials at Tulagi, at Auki, and especially to Captain and Mrs. Hill at Tunnibuli, Ysabel Island, for friendly aid. Mr. and Mrs. Charles R. Bignell of Fulakora Point, Ysabel, are already known in the history of zoological collecting in the Solomons for their hospitality

to Dr. William M. Mann in 1912. Prepared by this experience for the vagaries of naturalists, they took an active and most helpful interest in the work of our expedition. Three members of the scientific staff of the expedition were entertained at the Lady Lever Plantation at Webster Cove, on Kulambangra, by Messrs. Quintal and Keane. I am much indebted to Messrs. Walter A. Weber and Frank C. Wonder, of the staff of Field Museum, who found time, in addition to their work on birds and mammals, to render effective aid in the collection of amphibians and reptiles.

Thanks to the kindness of Dr. Thomas Barbour, Director of the Museum of Comparative Zoology at Harvard, and to the friendly aid of Mr. Arthur Loveridge at that institution, I have been able to examine specimens in the Mann Collection from the Solomons in the course of the present study.

## AMPHIBIA

### *Ceratobatrachus guentheri* Boulenger.

*Ceratobatrachus guentheri* Boulenger, Proc. Zool. Soc. Lond., 1884, p. 212, 1884.

One specimen from Tulagi; four from Auki, Malaita; and one from Tunnibuli, Ysabel.

These are all males, collected while croaking, and found sitting on the ground among dead leaves. The voice of the single Tulagi specimen so much resembled the "squunk-squunk" of a foot in a wet boot that Mr. Weber and I at first referred the sound to each other. The sounds produced by the Malaita frogs were comparable to a yelp or bark, with considerable variation. One of them introduced the barking note by a distinct mew. Evidently there is much variation in this frog's call, some of which may be geographical and indicative of the first step toward species formation by isolation. Extended observation would be required for any satisfactory conclusion on this point.

### *Batrachylodes vertebralis* Boulenger.

*Batrachylodes vertebralis* Boulenger, Proc. Zool. Soc. Lond., 1887, p. 337, pl. 28, fig. 3, 1887.

Ten specimens from Ugi; one from Tulagi; four from Auki, Malaita; three from Tunnibuli, Ysabel; and twelve from Webster Cove, Kulambangra.

Variation in the voice of this species from island to island is not satisfactorily connected with any other character. On Ugi the note

was a single isolated honk, repeated at short intervals. On Tulagi my notes describe it as a series of muffled clicks, like beating on metal. The single specimen taken was sitting on a leaf about four feet from the ground. On Malaita the note resembled that of Ugi specimens. Both types of voice were heard at Tunnibuli, on Ysabel, but the only specimens taken were calling with isolated notes. The singing males sit on fresh vegetation or on dwarf palm stems, usually from one to three feet above the ground. Ventriloquy is often extreme in the voice of this species.

***Cornufer guppyi* Boulenger.**

*Cornufer guppyi* Boulenger, Proc. Zool. Soc. Lond., 1884, p. 211, 1884.

A single specimen of this species was taken at Tunnibuli, Ysabel, sitting on vegetation at a height of about six feet, not singing.

***Platymantis solomonis* (Boulenger).**

*Cornufer solomonis* Boulenger, Proc. Zool. Soc. Lond., 1884, p. 212, 1884.

*Platymantis solomonis* Boulenger, Ann. Mag. Nat. Hist., (9), 1, p. 373, 1918.

One specimen from Auki, Malaita; three from Tunnibuli, Ysabel; and three from Webster Cove, Kulambangra.

The call of this species is distinctive and invariable from island to island. It consists of a loud "whoo-ee," rising from a rather low first note to a second much higher in pitch. The specimens secured were calling males. Each of the Malaita and Ysabel specimens was calling from the top of a fallen log. The three from Kulambangra called from similar slightly elevated and exposed positions, one from the top of a pile of coconut trash, one from a rock, and one from the ground.

Boulenger records two species of *Platymantis* from the Solomons, in which he is followed by Van Kampen (1923, p. 190); while Barbour (1921, p. 96, pls. 2-4) and Kinghorn (1928, p. 129), though commenting on the variation displayed among the specimens before them, agree in uniting the two supposed forms under the name *solomonis*. So far as the examination of museum specimens is concerned, the latter course might well be justified. Field observation, however, proves at once that there are two species readily distinguishable by voice and habits and, with these clues, by structural characters as well.

Boulenger's species *solomonis* was founded on large specimens; his type may be assumed to be the female specimen 75 mm. in length, mentioned in the original description. The two very large specimens

mentioned by Barbour (77 and 84 mm. long respectively) evidently belong here. I infer that the relative smoothness of the backs of the largest specimens is a sex as well as an age character. There is a further slight difficulty in associating our males with these females, for the latter have longer and more sharply defined series of vomerine teeth. It seems best to assume that this is also an age and sex and, to some extent, individual character. The seven male specimens of *solomonis* mentioned above range in length from snout to anus from 43 to 54 mm. Boulenger's, Barbour's, and Kinghorn's measurements for adult females range from 75 to 85 mm. The distinction of *solomonis* from the allied species will be discussed below.

***Platymantis weberi* sp. nov.**

*Type* from Tulagi, Solomon Islands. No. 13723 Field Museum of Natural History. Adult male. Collected April 12, 1929, by Karl P. Schmidt.

*Range*.—Certainly known from Tulagi and Ysabel Islands; presumably widespread in the Solomon group.

*Diagnosis*.—A *Platymantis* with short groups of vomerine teeth, shorter than the space which separates them; with numerous straight longitudinal dorsal folds, some of which are nearly continuous for the length of the back; snout somewhat more acute and upper eyelid much more rugose than in *solomonis*. Distinguished by more elongate and more numerous dorsal folds and by smaller size from the common species of *Platymantis* of New Britain and northern New Guinea which are lumped under the name *rugata* by Van Kampen.

*Description of type*.—Habitus frog-like, limbs long, the tibio-tarsal joint reaching the nostril; heels overlapping when the limbs are placed at right angles to the body; head large, snout pointed; snout longer than the eye, the nostrils much closer to its tip than to the eye. Vomerine teeth in short oblique series, close to the choanae, and separated from each other by an interspace greater than the length of one of the series; upper eyelids rugose, wider than the interorbital space; tympanum circular, with a strong curved fold above it, slightly more than half the diameter of the eye (14 : 23); loreal region flaring, concave; canthus rounded but easily distinguishable; tips of fingers and toes slightly dilated, the disks with a horizontal groove between their upper and lower surfaces; no webs; first finger slightly longer than the second; metacarpal and

subdigital tubercles well-defined; inner and outer metatarsal tubercles present, subequal, rounded; tarsal fold feebly marked; throat smooth, belly granulate posteriorly; dorsum with about six series of elongate glandular ridges, three on each side, some nearly continuous, enclosing somewhat shorter ridges on the mid-dorsal area; sides with small rounded tuberculation.

Dark brown above with a dorsolateral band of dull purplish red on each side and a bright spot of the same color on the upper lip between the eye and nostril; limbs barred, the lighter interspaces tinged with red; ventral surfaces light, unmarked except for faint dusky spots along the edge of the lower jaw.

*Measurements.*—Three male specimens. F.M.N.H. Nos. 137, type, 13757, paratype, and 13832, *Platymantis solomonis*, for comparison: snout to vent 32.3, 37.7, 50 mm.; snout to posterior border of tympanum 14.2, 15.9, 21.6; greatest width of head 13, 14.5, and 21.7; length of eye 4.6, 5.2, 8.2; diameter of tympanum 2.8, 2.8, 4.2; hind limb from anus 57, 62, 77; tibia 17.3, 19.1, 23.3; fore limb 20, 22, 31.

*Notes on paratypes.*—The series of eleven paratypes exhibits great uniformity of size and of dorsal rugosity. All were calling males, singing from every variety of situation. The call is a series of uniformly repeated unmusical squawks. The suffusion of red or reddish purple which appears in the upper parts of the type is variable in intensity and is absent in some specimens. The ratio of the width of the head to its length from the tip of the snout to the posterior border of the tympanum varies from .86 to .96, averaging .91. These two measurements are equal or nearly so in *Platymantis solomonis*.

*Remarks.*—This is plainly the form recorded by Boulenger as *Cornufer corrugatus* (1888, p. 88) from Guadalcanar and New Georgia, and Van Kampen's inclusion of the same form as *Rana rugata* in his Solomon Island list (1923, pp. 191, 287) is evidently based on Boulenger's record. It is probably directly allied to the common and widespread species of *Platymantis* of New Britain and New Guinea, but I see no reason for including it with the forms of these islands. The specimens from New Britain and from New Guinea, which are available to me for comparison, certainly do not indicate specific identity. The species is named for Mr. Walter A. Weber, artist and ornithologist for the Crane Pacific Expedition, my companion on many nocturnal frog-collecting tramps.

***Rana krefftii* Boulenger.**

*Rana krefftii* Boulenger, Cat. Batr. Salientia, Brit. Mus., p. 64, pl. 3, fig. 2, 1882.

Two specimens from Auki, Malaita, and three from Tunnibuli, Ysabel.

The Malaita specimens were found on the forest floor near a creek, not singing. The Ysabel specimens were singing in mats of wet vegetation, the note a loud quack, repeated a dozen times or continuous for a considerable period. The species was extremely shy.

***Rana guppyi* Boulenger.**

*Rana guppyi* Boulenger, Proc. Zool. Soc. Lond., 1884, p. 211, 1884.

One specimen from Tunnibuli, Ysabel, was obtained from a native.

***Rana bufoniformis* Boulenger.**

*Rana bufoniformis* Boulenger, Proc. Zool. Soc. Lond., 1884, p. 210, 1884.

One specimen from Tunnibuli, Ysabel, and one from Webster Cove, Kulambangra.

These specimens were calling from situations on the forest floor where shallow water overlay mud and leaves. The call of the Ysabel specimen was a hoarse croak, somewhat like that of the American *Rana pipiens*, but with the individual notes more distinctly isolated and uniform.

These two specimens differ in a number of respects which, if constant in a series, would amply warrant specific distinction. The web between the toes is full in both, but is more deeply incised in the Kulambangra specimen; the breadth of the tibia is contained about 2.6 times in that of the one from Kulambangra; the tympanum is smaller and more obscure in the Ysabel specimen; the vomerine teeth are more widely separated and closer to the choanae in the Kulambangra specimen; and the latter is much smoother than the other specimen, though fine horny spinules are present posteriorly and on the hind limbs. The Ysabel specimen is covered with much larger warts which are made up of groups of distinct spinules like those of the Kulambangra specimen. The internal vocal sacs in both specimens have very distinct round openings well forward on the floor of the mouth, the mucous membrane around them being distinctly thickened and puckered.

Of these two specimens, the one from Kulambangra corresponds fairly well with *Rana opisthodon* and the Ysabel specimen with

*Rana bufoniformis*. I am deterred from reviving *Rana opisthodon* by lack of material, and by the conviction that such closely allied forms require discrimination by field study together with the check on sexual differences which can only be supplied by mated pairs.

## REPTILIA

### **Gymnodactylus pelagicus** (Girard).

*Heteronota pelagica* Girard, Proc. Acad. Nat. Sci. Phila., 1857, p. 97, 1857.

*Gymnodactylus pelagicus* Boulenger, Cat. Lizards Brit. Mus., 1, p. 40, 1885.

One from Auki, Malaita; seven from Tunnibuli, Ysabel; and six from Webster Cove, Kulambangra.

### **Lepidodactylus lugubris** (Duméril and Bibron).

*Platydictylus lugubris* Duméril and Bibron, Erpétologie Générale, 3, p. 304, 1836.

*Lepidodactylus lugubris* Fitzinger, Systema Reptilium, p. 93, 1843.

Four specimens from Fulakora Point, Ysabel.

It is curious that this extremely widespread species has not previously been recorded from the Solomon group. The present specimens were collected from the walls of the plantation house of Mr. C. R. Bignell.

### **Varanus indicus** (Daudin).

*Tupinambis indicus* Daudin, Hist. Nat. Rept., 3, p. 46, pl. 30, 1802.

*Varanus indicus* Boulenger, Cat. Lizards Brit. Mus., 2, p. 316, 1885.

One specimen from Tunnibuli, Ysabel, and a second from Webster Cove, Kulambangra.

These two specimens differ strikingly in coloration, and neither agrees with Mertens' recent definition of *Varanus indicus douarrha* (Lesson) as the subspecies of *indicus* characteristic of the Bismarck Archipelago and the Solomon Islands. I have accordingly avoided the question of subspecific designation for the Solomon Island monitor, hoping to return to this subject in connection with New Guinean specimens collected by the Crane Pacific Expedition.

### **Corucia zebrata** Gray.

*Corucia zebrata* Gray, Proc. Zool. Soc. Lond., 1855, p. 218, pl. 8, 1855; Shurcliff, Jungle Islands, p. 193, pl. facing p. 182, 1930.

Three specimens of the species were secured from a native collector at Tunnibuli, Ysabel Island.

The largest of them served as model for a watercolor by Mr. Weber. The well-developed prehensility of tail, an unusual charac-



ter in lizards in general, is the more surprising in a member of the family Scincidae because of the bony armor which underlies the skin. The strongly clawed, compressed, and hooked digits also adapt this creature for arboreal life.

The length of F.M.N.H. No. 13726 is 715 mm., tail 398, leg 110, arm 90, snout to posterior border of ear 57, greatest width of head 50. The disposition of the head shields is highly variable. All three specimens exhibit a well-defined transverse white band on the throat.

***Riopa albofasciolata* (Günther).**

*Eumeces albofasciolatus* Günther, Ann. Mag. Nat. Hist., (4), 10, p. 370, 1872.

*Riopa albofasciolatum* Barbour, Mem. Mus. Comp. Zool., 44, p. 187, 1912.

A single specimen from Pava, Hathorn Sound, New Georgia.

***Sphenomorphus solomonis* (Boulenger).**

*Lygosoma solomonis* Boulenger, Proc. Zool. Soc. Lond., 1887, p. 334, 1887.

*Sphenomorphus solomonis* Barbour, Mem. Mus. Comp. Zool., 44, p. 185, 1912.

A single specimen from Tunnibuli, Ysabel, found under a log.

***Sphenomorphus concinnatus* (Boulenger).**

*Lygosoma concinnatum* Boulenger, Proc. Zool. Soc. Lond., 1887, p. 335, 1887.

*Sphenomorphus concinnatus* Barbour, Mem. Mus. Comp. Zool., 44, p. 185, 1912.

One specimen from Auki, Malaita; two from Tunnibuli, Ysabel; and one from Webster Cove, Kulambangra.

***Sphenomorphus cranei* sp. nov.**

*Type* from Tunnibuli, Ysabel, Solomon Islands. No. 13776 Field Museum of Natural History. Collected April 16, 1929, by Karl P. Schmidt.

*Diagnosis.*—A *Sphenomorphus* with elongate snout, two series of transversely enlarged dorsal scales, relatively large ear opening, without auricular lobules; color dark brown with narrow transverse yellow bands; allied to *S. maindroni* (Sauvage).

*Description of type.*—Body slender, with well-developed limbs; head elongate, with narrow snout; lower eyelid scaly; ear opening large, without auricular lobules; nostril in a single large nasal; rostral extended on the upper surface of the snout, forming a suture with the frontonasal; prefrontals forming a broad suture; frontal elongate, in contact with the two anterior supraoculars; four supraoculars,

followed by a small scale which might be interpreted as a fifth; ten supraciliaries; frontoparietals distinct, subequal to the interparietal; no enlarged nuchals; eight upper labials; a single postmental followed by two pairs of chin shields in contact; parietals forming a suture behind the interparietal; no enlarged nuchals; twenty-eight smooth lamellae beneath the fourth toe; thirty-two scales around the body; the two mid-dorsal rows largest; seventy-nine scales from parietal border to a point opposite the posterior face of the thigh; preanals slightly enlarged.

Pale yellow beneath, throat, chin, and breast with dark brown spots; dark brown above, the head shields with small yellow spots, the dorsum with narrow transverse yellow bands; the sides reticulate with dark markings enclosing spots of the yellow ground color; about fifteen transverse bands on back; tail lighter than back, also with narrow transverse bands.

*Measurements*.—Snout to anus 49 mm.; snout to posterior border of ear 10.8; arm 12.5; leg 20; width of head 6.1.

*Remarks*.—The type is unfortunately unique. The species seems to be amply distinguished from the New Guinean *S. maindroni* by its more elongate snout and larger ear opening. The species is named for Mr. Cornelius Crane, leader and patron of the Crane Pacific Expedition of Field Museum of Natural History.

### ***Sphenomorphus bignelli* sp. nov.**

*Type* from Webster Cove, Kulambangra, Solomon Islands. No. 13841 Field Museum of Natural History. Collected April 21, 1929, by Karl P. Schmidt.

*Diagnosis*.—A small *Sphenomorphus* allied to *S. minutus* (Meyer), from which it is distinguished by having fewer scales around the body, a more pointed snout, larger prefrontals, and a larger number of subdigital lamellae.

*Description of type*.—Habitus rather stocky, body subquad-rangular in cross section; limbs moderate, overlapping when pressed along the side; head a little wider than body, snout pointed; lower eyelid scaly; ear opening large, without auricular lobules; nostril in a single nasal; no supranasals; rostral forming a long straight suture with the frontonasal; frontonasal narrowly in contact with the frontal; prefrontals well developed; frontal elongate, in contact with the two anterior supraoculars; four supraoculars; seven supraciliaries; frontoparietals distinct, somewhat larger than the interparietal; a

few postparietal scales enlarged, but no large transverse nuchals; parietals broadly in contact behind the interparietal; six upper labials; one pair of chin shields in contact behind the single postmental; eighteen smooth lamellae beneath the fourth toe; twenty-two scales around the body; thirty-nine scales from the parietals to the posterior face of the thigh; a pair of enlarged preanals.

General color dark reddish brown above, pale yellow beneath; a somewhat ill-defined narrow black dorsolateral line is bordered above between the hind limbs by a sharply defined lighter band, as wide as a scale-row; the sides below the dorsolateral band have scattered light spots occupying, usually, a single scale; the labial border has alternate brown and pale yellow spots; a fairly well-defined brown latero-ventral line separates the pale under side of the tail from the spotted sides.

*Measurements.*—Total length 68 mm.; snout to anus 33; snout to posterior border of ear 7.5; width of head 4.7; arm 8; leg 12.

*Notes on paratypes.*—Among the four paratypes, F.M.N.H. Nos. 13842–5, all from the type locality, two have the prefrontals more widely separated than the type, while in the remaining two these scales are broadly in contact; the subdigital lamellae beneath the fourth toe are eighteen in one, twenty in three. The scales around mid-body are uniformly in twenty-two rows.

*Remarks.*—This is plainly the Solomon Island representative of *Sphenomorphus minutus* (Meyer), of New Guinea. The species is named for Mr. Charles R. Bignell of Fulakora Point, Ysabel, whose aid to our party and to other naturalists in the Solomons has been mentioned above.

### ***Dasia smaragdinum perviridis* Barbour.**

*Dasia smaragdinum perviridis* Barbour, Proc. New Eng. Zool. Club, 7, p. 106, 1921.

*Dasia smaragdinum perviride* Mertens, Zool. Anz., 84, p. 219, 1929.

One specimen from Tunnibuli, Ysabel.

### ***Leiolopisma noctua* (Lesson).**

*Scincus noctua* Lesson, Voy. Coquille, Zool., 2, p. 48, pl. 3, fig. 4, 1830.

*Leiolopisma noctua* Stejneger, Proc. U. S. Nat. Mus., 21, p. 805, 1899.

A single specimen from the coconut plantation at Webster Cove, Kulambangra.

***Emoia atrocostata* (Lesson).**

*Scincus atrocostatus* Lesson, Voy. Coquille, Zool., 2, p. 50, pl. 4, fig. 3, 1830.

*Emoia atrocostatum* Barbour, Mem. Mus. Comp. Zool., 44, p. 94, 1912.

A single specimen from Tunnibuli, Ysabel, adds this species to the Solomon Island list.

***Emoia nigra* (Hombron and Jacquinot).**

*Eumeces niger* Hombron and Jacquinot, Voy. au Pole Sud, Zool., 3, Rept., p. 11, pl. 4, fig. 2, 1853.

*Emoia nigrum* Barbour, Mem. Mus. Comp. Zool., 44, p. 137, 1912.

Two specimens from Auki, Malaita, and nine from Tunnibuli, Ysabel.

***Emoia flavigularis* sp. nov.**

*Type* from Tunnibuli, Ysabel. No. 13793 Field Museum of Natural History. Adult female. Collected April 19, 1929, by Karl P. Schmidt.

*Diagnosis*.—An *Emoia* allied to *E. nigra*, from which it is distinguished by having a higher number of subdigital lamellae, parietal fused with interparietals, prefrontals normally forming a suture, temporals 2-2 instead of 2-3, and a bright yellow throat, distinct in color from the rest of the venter.

*Description of type*.—Body stout, head short, limbs well developed, tail moderate. A pair of small supranasals; rostral and frontonasal in contact; prefrontals forming a broad suture; frontal in contact with two anterior supraoculars; four supraoculars with a very small fifth; eight supraciliaries; interparietals and parietal fused into a single shield behind which the parietals are broadly in contact; a single pair of large nuchals; temporals 2-2, the lower temporal of the second row large; ear opening large, without auricular lobules; nine upper labials; one pair of chin shields in contact behind the single postmental; dorsal scales smooth; scales around mid-body forty; from parietal to posterior border of thigh fifty-eight; subdigital lamellae of the fourth toe forty-three; no enlarged preanals.

Dark reddish brown above on back and limbs, with brilliant iridescence, darker on sides with no light spots; venter lighter than sides, dark gray with yellowish suffusion; chin and throat nearly as far back as the arms bright yellow.

*Measurements*.—Length from snout to anus 65 mm.; snout to posterior border of ear 16.1; breadth of head 9.5; arm 23; leg 36.

F.M.N.H. No. 13794 measures 58 from snout to anus, with a total length of 163; arm 22; and leg 34.

*Notes on paratypes.*—The three paratypes, F.M.N.H. Nos. 13781, 13785, and 13794 are all from the type locality. They agree with the type in the diagnostic characters mentioned. The subdigital lamellae are forty-two in two, forty-one in one. The scales around the body are forty in a second female, thirty-six in a small male.

*Remarks.*—In spite of its great similarity to *Emoia nigra*, there seems no doubt that this is a perfectly distinct species. Two of the specimens are adult females with well-developed eggs, so that *flavicularis* is evidently a much smaller form than *nigra*. There does not appear to be any close relative of this species in New Guinea, and it may be supposed to have developed from *E. nigra* to fill some ecological niche rather than to be a product of geographic isolation like *Sphenomorphus bignelli*.

### ***Emoia cyanogastra* (Lesson).**

*Scincus cyanogaster* Lesson, Voy. Coquille, Zool., 2, p. 47, pl. 3, fig. 3, 1830.

*Emoia cyanogaster* Barbour, Mem. Mus. Comp. Zool., 44, p. 94, 1912.

One specimen from Ugi, and four from Tunnibuli, Ysabel.

### ***Emoia triviale* (Schüz).**

*Lygosoma werneri triviale* Schüz, Abh. Ber. Mus. Dresden, 17, No. 2, p. 8, 1929.

Two specimens from Webster Cove, Kulambangra.

This name is used for the form defined as *kordoanum* by Sternfeld and as *lessoni* by Parker, but the status of *werneri* (from the Mariannas) and its subspecies is by no means clear.

### ***Emoia cyanura* (Lesson).**

*Scincus cyanurus* Lesson, Voy. Coquille, Zool., 2, p. 49, pl. 4, fig. 2, 1830.

*Emoia cyanura* Stejneger, Proc. U. S. Nat. Mus., 21, p. 807, 1899.

Two specimens from Ugi, eight from Auki, Malaita, and fifteen from Tunnibuli, Ysabel, represent the normal color form of this species.

In these twenty-five specimens the median stripe is sharply defined on the head and anterior portion of the back. It is sharply defined to the base of the tail in seven specimens, while in the remaining eighteen it broadens and becomes diffuse before it reaches the middle of the back, and may be quite indistinguishable posteriorly. This difference does not seem to be in any way an age character.

No specimen in this series exhibits median dorsal scales with the mid-dorsal stripe confined to them, as elsewhere so often shown as a variation in *Emoia cyanura*.

Two further series of specimens, seven from Ugi and thirteen from Kulambangra, differ radically from the normal *cyanura* in lacking the mid-dorsal stripe on the head (and back as well) at all ages. In these, furthermore, the dorsolateral stripes are wider, on two scale-rows instead of one, so the number of scale-rows between the outer borders of these dorsolateral stripes is eight instead of six, as in normal *cyanura*. This color character is so stable and clearly defined that it is possible that this unstriped form represents a species or series of insular forms distinct from *cyanura*. It seems best to leave this question for local field investigation, for the study of much larger series, and especially for the examination of sets of newly hatched young, which are required to clear up the taxonomic questions involved. The matter is still more complicated by an invariable difference between the Ugi and Kulambangra specimens. The former have the dorsal area between the dorsolateral stripes variegated black, spotted with green and frequently with a wide diffuse greenish band on the middle portion of the back. In the Kulambangra series the dorsal space is uniform brown, with a notably greater tendency to iridescence, and with only a narrow unspotted black border above the dorsolateral stripe.

### **Typhlops aluensis** Boulenger.

*Typhlops aluensis* Boulenger, Proc. Zool. Soc. Lond., 1887, p. 336, pl. 28, fig. 2, 1887.

One specimen from Webster Cove, Kulambangra, April 21, 1929, F.M.N.H. No. 13836, has 22 scales about the body and 273 in a dorsal row from the rostral to a point above the anus, with 21 more on the tail.

### **Enygrus carinatus** (Schneider).

*Boa carinata* Schneider, Hist. Amphib., Fasc. 2, p. 261, 1801.

*Enygrus carinatus* Duméril and Bibron, Erpétol. Gén., 6, p. 479, 1844.

One specimen from Ugi and three from Tunnibuli, Ysabel.

### **Chersydrus granulatus** (Schneider).

*Hydrus granulatus* Schneider, Hist. Amphib., Fasc. 1, p. 243, 1799.

*Chersydrus granulatus* Gray, Cat. Snakes Brit. Mus., p. 61, 1849.

One specimen, from Tunnibuli, Ysabel, appears to furnish the second record of this species from the Solomon Archipelago.

**Ahaetulla calligastra salomonis** (Günther).

*Dendrophis salomonis* Günther, Ann. Mag. Nat. Hist., (4), 9, p. 25, 1872.

Four male specimens, one from Ugi, one from Auki, Malaita, one from Tunnibuli, Ysabel, and one from Webster Cove, Kulambangra.

I have retained Mertens' subspecific classification in spite of the fact that the present specimens fail to support his tentative diagnosis of the Solomon Island form (Mertens, 1926, p. 278). The Kei Island subspecies appears to be well founded so that some partition into subspecies will, in any case, be necessary. The Solomon Island specimens have a yellow chin and throat, while New Guinean specimens are white, but this character evidently appears in other parts of the range of the species.

In the order listed above, these specimens have 192, 190, 181, and 183 ventrals, 128, 142, (tail incomplete), and 132 subcaudals; upper labials 9-9, 8-9, 8-9, and 8-8; lower labials 10-10, 10-11, 10-10, and 9-9; oculars uniformly 1-2; and temporals in the first row 2-2, 2-2, 2-1, and 2-2.

If all the ventral scale counts of this species available from the Solomons are listed, they appear to fall into two series, one (ten specimens, female) from 178 to 188, the other (three specimens, female) from 200 to 203, while the counts of the small number of males available also break into a series of four from 177 to 183 and another of four from 190 to 194. Therefore, one might suspect that the series with the higher number of ventrals in both sexes belongs to the southeastern Solomons, while the other ranges through the larger islands from Guadalcanar and Ysabel to New Georgia and Faro. Additional specimens are required to substantiate this possible further subdivision of the species. Ventral counts of specimens from New Britain range from 189 to 195.

**Denisonia par** (Boulenger).

*Hoplocephalus par* Boulenger, Proc. Zool. Soc. Lond., 1884, p. 210, 1884.

*Denisonia par* Boulenger, Cat. Snakes Brit. Mus., 3, p. 345, 1896.

One female specimen from Tunnibuli, Ysabel.

Ventrals 168, anal divided, subcaudals 47, upper and lower labials 7 on each side, oculars and temporals 1-2 on each side, total length 914 mm., tail 144 mm.

**Denisonia woodfordii** (Boulenger).

*Hoplocephalus woodfordii* Boulenger, Proc. Zool. Soc. Lond., 1888, p. 89, 1888.

*Denisonia woodfordii* Boulenger, Cat. Snakes Brit. Mus., 3, p. 346, 1896.

One female specimen from Webster Cove, Kulambangra, has 164 ventrals, 42 subcaudals, 7 upper and lower labials on each side, and oculars and temporals 1-2 on each side.

**Laticauda colubrina** (Schneider).

*Hydrus colubrinus* Schneider, Hist. Amphib., Fasc. 1, p. 238, 1799.

*Laticauda colubrina* Stejneger, Bull. U. S. Nat. Mus., 58, p. 406, 1907.

Fourteen specimens from Tunnibuli, Ysabel.

**Crocodilus porosus** Schneider.

*Crocodilus porosus* Schneider, Hist. Amphib., Fasc. 2, p. 159, 1801.

A fragment of a very large skull of this species was presented to the Museum by Mr. Charles R. Bignell of Fulakora Point, Ysabel. This crocodile had been killed many years before by a dynamite bomb, which broke up the skull; according to Mr. Bignell it measured 18 feet 9 inches. The greatest premaxillary breadth of the fragment is 170 mm., the breadth at the fifth maxillary tooth is 231 mm., and the diameter of the alveolus of the fifth maxillary tooth is approximately 37 mm.

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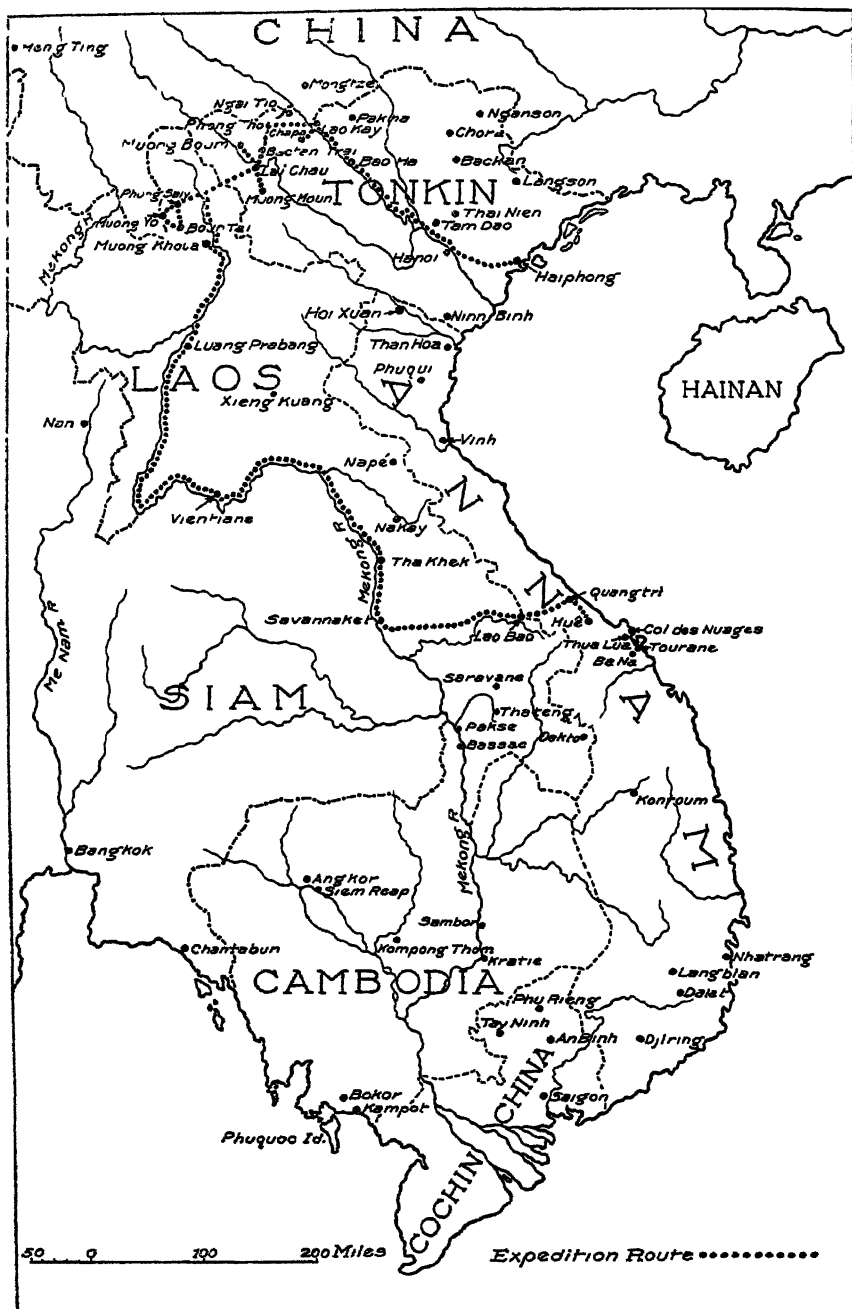
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MAP SHOWING ROUTE OF INDO-CHINESE SECTION OF KELLEY-ROOSEVELTS  
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BY

WILFRED H. OSGOOD

CURATOR, DEPARTMENT OF ZOOLOGY



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# MAMMALS OF THE KELLEY-ROOSEVELTS AND DELACOUR ASIATIC EXPEDITIONS

BY WILFRED H. OSGOOD

The William V. Kelley-Roosevelts Asiatic Expedition of Field Museum in 1928-29, by division into three sections, was able to cover a wide extent of territory in central and southeastern Asia. Each section touched faunal areas not reached by the others and the resulting collection of mammals is one of unusual size, variety, and interest. The species represented are from such diverse regions as the tropical coast of Cochin China and the lofty mountains of western Szechwan toward the borders of Thibet. Nevertheless, it seems best to record the entire collection in a single report. In fact, as appears later, there are advantages in doing so, for western China, in spite of its temperate climate, has a mammalian fauna many elements of which extend into French Indo-China.

The expedition, so liberally financed by the late William V. Kelley, a Trustee and Benefactor of Field Museum, was one of the best equipped ever to take the field in Asia and, considering the short time of actual operations, the results are quite remarkable. Colonel Theodore Roosevelt and his brother, Kermit Roosevelt, with their friend, C. Suydam Cutting, formed what may be called the first section. They traveled rapidly, covering a long route and devoting themselves mainly to hunting large game and animals of especial rarity. Their Chinese interpreter, Jack Young, was equipped for collecting small mammals, and, although his time for this was quite limited, he "picked up" occasional specimens of interest. This first section, starting from Rangoon, proceeded directly through Burma to Bhamo and thence northward via Tengyueh, Talifu, Likiang, Yungning, Muli, and Chiulung to Tatsienlu. From this well-known place they went to Mouping and then, returning southward through Yachow, they crossed the Tung River and continued just east of the Yalung River through Yehli, Tachow, and Ningyuan and thence very rapidly to railhead at Yunnanfu. From this point, Kermit Roosevelt, in response to urgent demands, returned to the United States while Theodore Roosevelt and C. Suydam Cutting went on to Saigon, Cochin China, to procure specimens of large game, especially seladang, banteng, and water buffalo. A full

account of the trip through Yunnan and Szechwan with illustrations and a detailed map has since been published.<sup>1</sup>

What may be called the second section was conducted by Herbert Stevens, who accompanied the Roosevelts as far as Likiang and subsequently continued alone, making detailed collections along a route somewhat similar to theirs through Yunnan and Szechwan. Mr. Stevens has published a brief account of his itinerary with sketches of peaks and a small map of the region about Tatsienlu.<sup>2</sup> He states: "On March 7 I left Likiang, spending fifty-five days en route in camp and thirty-eight days on the march, via Yungning, Muli, Kopadi, Kulu, Kon La 14,600 feet, Yonka La 15,000 feet, Tiyu 12,900 feet (Gompa), Yatsu 11,200 feet, Baurong 8,000 feet, Patei, Wushi 12,000 feet, Kusata (Gompa), Chentze 13,000 feet, Laila hamlet 12,400 feet, Chaulu 13,600 feet (Gompa), Lai Chu, Zamba Ku 11,600 feet, Trazya 12,100 feet, Haja Tungu 13,000 feet (Gompa), Haja La 15,300 feet, Cheto, to Tatsienlu, where I arrived June 1." Mammals were collected along most of this route and later from a few other localities, mainly Ulongkong, a short distance south of Tatsienlu, and Hlagong, a short distance west. An account of the birds, which are represented by many more localities than the mammals, is soon to be published by Field Museum.

The mammals collected by Stevens number about five hundred, providing a good representation of the general mammal fauna of central Yunnan and western Szechwan. At Wushi, between Baurong and Tatsienlu and east of the Yalung River, he obtained two undescribed subspecies of rodents, a vole (*Eothenomys custos hintoni*) and a pika (*Ochotona cansa stevensi*).

The third section of the expedition devoted itself to concentrated work in northern Indo-China, mainly in the province of Tonkin. Under the leadership of Harold J. Coolidge, Jr.,<sup>3</sup> a party of four was organized in which Russell W. Hendee was the mammalogist, Josselyn Van Tyne<sup>4</sup> ornithologist, and Ralph E. Wheeler physician and parasitologist. After a brief stop in Annam, where collections were made near Quangtri, this party proceeded to Haiphong and Hanoi and thence up the valley of the Riviere Noire. They passed on into northern Laos and worked there from a base at Phong Saly,

<sup>1</sup>Theodore and Kermit Roosevelt, *Trailing the Giant Panda*, Charles Scribner's Sons, New York, 1929.

<sup>2</sup>Geog. Journ., 75, pp. 353-356, 1930.

<sup>3</sup>Now Assistant Curator of Mammals, Museum of Comparative Zoology, Cambridge, Mass.

<sup>4</sup>Assistant Curator of Birds, Museum of Zoology, University of Michigan.

finally descending the Mekong River with a short stop at Vientiane to Savannaket and thence overland to Huê. The route is shown on the accompanying map (Plate IX, facing p. 191) and in the report on the birds,<sup>1</sup> which has already been published, there is given a complete list and description of all localities visited.

Original plans had contemplated that the Roosevelts in returning from China would join the Indo-Chinese section on the Mekong River, but circumstances prevented and, instead, Mr. Hendee, on May 14, detached himself from the rest of the party in Laos and started down the Mekong, intending to go to Huê and thence around the coast to join Theodore Roosevelt at Saigon. Shortly after leaving, Hendee was attacked by a malignant fever which increased in intensity until he reached Vientiane and was there taken to a hospital in a critical condition on June 3. Three days later, in spite of the best available care, he died, leaving a record as one of the best all-around zoological collectors who ever took the field.

Largely due to Hendee's skill and energy, the Indo-Chinese collection of mammals is one of exceptional variety and interest. Nothing escaped him, and his specimens, as Thomas has said previously of those taken by him in South America, "are a delight to work with."

Another feature contributing materially to the success of the Indo-Chinese section of the expedition was the whole-hearted cooperation of French officials. Grateful acknowledgments are due to P. Jabouille, at that time Administrator of Annam and himself an ornithologist of note, co-author with Jean Delacour of the sumptuous, four-volume work "*Les Oiseaux de l'Indochine Française*."<sup>2</sup> Jabouille detailed several trained native collectors to accompany the expedition; he opened his own house in Huê to the party; and both officially and personally he rendered invaluable assistance wherever possible.

The choice of Indo-China as a field for concentrated work by one division of the Kelley-Roosevelts Expedition, although a natural one from its geographic position in relation to the other areas visited, was largely influenced by the advice and cooperation of the prominent French ornithologist, Jean Delacour. For some years Delacour has been conducting explorations in French Indo-China and, although his primary interest is in birds, his expeditions in every case have

<sup>1</sup>Bangs and Van Tyne, *Field Mus. Nat. Hist., Zool. Ser.*, 18, No. 3, pp. 33-119, 1931.

<sup>2</sup>Exposition Coloniale Internationale, Paris, 1931.



made important collections of mammals. These mammals were sent mainly to the British Museum where they were studied and described by the late Oldfield Thomas. Just prior to this cooperation with Delacour, the British Museum had, itself, in 1923, sent Herbert Stevens into Tonkin especially to collect mammals. The result was a series of four publications by Thomas from 1925 to 1929 (p. 199) on mammals from French Indo-China in which no less than nineteen supposed new forms were described and knowledge of the fauna, especially that of Tonkin, was enormously enlarged.

In studying the collections of the Kelley-Roosevelts Expedition, it became of the utmost importance to examine the types of the new forms lately named by Thomas and to make comparison with the accumulation of Indo-Chinese mammals in the British Museum, this being the only collection of any size in existence from the region. Through reservation of funds generously provided by William V. Kelley this was made possible, and a large number of selected specimens were taken to London and studied in connection with the unrivaled collection there. The cordial cooperation of the authorities of the British Natural History Museum made this a most pleasant and profitable undertaking. Especial thanks are due and most gratefully rendered to the Director, C. Tate Regan, to the Keeper of Zoology, M. T. Calman, and to the Assistant Keeper of Zoology, M. A. C. Hinton, in charge of the Division of Mammals.

While this work was under way, still another Indo-Chinese collection was received at the British Museum from M. Delacour. This was made in 1929-30, after the return of the Kelley-Roosevelts Expedition, the collecting having been done by Delacour in person with the assistance of the British collector, Willoughby Lowe. The advantages of studying this collection in conjunction with the one already in hand were obvious and its generous submission for that purpose through agreement between Delacour and the British Museum was gratefully accepted. As a result, after brief preliminary examination in London, a large part of this collection was shipped to Field Museum where it has been worked out in detail. Division of the collection leaves a large share of it in the British Museum and in Field Museum, with a considerable number assigned to the Paris Museum, including certain specimens of large size especially taken by Delacour for mounting and exhibition at the French Colonial Exposition of 1931. Types of new forms, seven in number, are in the British Museum.

In size and importance, the collection made by Delacour and Lowe in 1929-30 rivals that of the Kelley-Roosevelts Expedition, but the number of localities represented is much more limited. By far the greater part of it is from the vicinity of Chapa, Tonkin. Continuous work was carried on at this place for two months during November and December, 1929. A large corps of native collectors was organized which brought in material from all the surrounding country, including localities well above Chapa, and others doubtless well below it. Most of the specimens are labeled simply "Chapa," but a considerable number are definitely designated as coming from "Lo Qui Ho," a station high up on the slopes or perhaps at the very summit of Mount Fan Si Pan, which rises behind Chapa to a height variously stated as from 8,000 to 10,000 feet, the altitude of Chapa being 4,300 feet. The exact altitude for individual specimens, therefore, is not certain in all cases. Besides those from the vicinity of Chapa, the collection contains an interesting series of specimens from Hoi Xuan, a locality near the coast in Annam and just below the border of Tonkin in a region having faunal affinity with Tonkin rather than Annam. In addition there are about seventy specimens from various localities, some of them quite far south in Annam and even in Cambodia, collected by the French botanist Poilane and obtained from him by Delacour and Jabouille.

A small but interesting collection made by F. R. Wulsin in 1924 for the United States National Museum has also been examined in conjunction with the other material from the same region. It consists of about fifty specimens, mainly from Lai Chau in northwestern Tonkin and Vientiane on the Mekong River in Laos. For the privilege of reviewing this collection, I am indebted to Gerrit S. Miller, Curator of Mammals.

Finally, a further Indo-Chinese collection of mammals has lately been acquired by Field Museum through cooperation with Delacour. This consists of some 215 specimens, including species not otherwise well represented and providing welcome information as to ranges and relationships. The collection was made by Delacour and assistants during a brief expedition from November 18, 1931, to January 26, 1932. A much more extensive expedition had been intended but circumstances prevented and work was confined to a few localities about the Boloven Plateau in southern Laos. The exact localities, all of which are near latitude 15° N., are described by Delacour, as follows:

*Pakse.* On the Mekong River. Altitude 300 feet.

*Thateng.* On the eastern border of the Boloven Plateau, ninety kilometers northeast of Pakse. Altitude 3,000 feet.

*Banphone.* On the side of the Boloven Plateau, forty kilometers east of Thateng. Altitude 600 feet.

*Saravane.* Forty-five kilometers northeast of Thateng. Altitude 4,800 feet.

*Paleng.* Four kilometers northeast of Thateng. Altitude 2,500 feet.

*Bassac.* On the right (west) bank of the Mekong nearly opposite Pakse. Altitude 300 feet.

*Phukong Ntoul.* Twenty-five kilometers southwest of Thateng. Altitude 4,800 feet.

Owing to its late arrival just as this report was being completed for the press, the last Delacour collection has not had wholly satisfactory examination mainly because all the skulls were not cleaned and the larger skins not "made up." It has seemed important, however, to list all the specimens and so far as possible to bring knowledge of the region to date.

Although the several collections above mentioned cover by far the larger part of the mammals of Tonkin, Laos, and Annam, and although in studying them it has been necessary to review practically the entire mammal fauna, the time for an exhaustive account of the mammals of Indo-China is still in the future. Such an account preferably should combine field work and museum study. For the present, therefore, I have been content to record mainly the material in hand. In order to bring the work of recent years together, however, the records published in four papers by Thomas have been collated and included so far as possible. Therefore all the expeditions sponsored or participated in by Delacour are covered.

In recording specimens from the different collections, slight abbreviations have been used as follows:

1. K.-R.—Kelley-Roosevelts Expedition, including specimens collected by Theodore Roosevelt, Kermit Roosevelt, C. Suydam Cutting, Herbert Stevens, Jack Young, Harold J. Coolidge, Jr., Russell W. Hendee, Ralph E. Wheeler, Josselyn Van Tyne. Material in Field Museum.

2. D. & L. 1929-30.—Specimens collected by Jean Delacour, P. Jabouille, Willoughby Lowe, and H. Poilane. Material in British Museum, Field Museum and Paris Museum.

3. WULSIN 1924.—Specimens collected by F. R. Wulsin. Material in United States National Museum.

4. DEL. 1931-32.—Specimens collected by Jean Delacour. Material in Field Museum.

5. REC. 1925-29.—Specimens collected by Herbert Stevens, Jean Delacour, Willoughby Lowe. Material in British Museum and Paris Museum. Records published in Proc. Zool. Soc. Lond., 1925, pp. 495-506; 1927, pp. 41-58; 1928, pp. 139-150; 1928 (Jan., 1929), pp. 831-841.

In the lists of specimens, Indo-Chinese localities have their respective provinces indicated by the initial letters, as A. for Annam, L. for Laos, C. for Cambodia, C.C. for Cochin China.

New forms described are as follows:

<i>Pithecius delacouri</i>	<i>Callosciurus flavimanus bolovens</i>
<i>Macaca assamensis coolidgei</i>	<i>Dremomys pyrrhomerus gularis</i>
<i>Triaenops wheeleri</i>	<i>Tamias monticolus olivaceus</i>
<i>Myotis siligorensis alticranatus</i>	<i>Typhlomys cinereus chapensis</i>
<i>Discopus denticulus</i>	<i>Rattus indosinicus</i>
<i>Neotetracus sinensis fulvescens</i>	<i>Dacnomys millardi ingens</i>
<i>Chodsigoa lowei</i>	<i>Vandeleuria dumeticola scandens</i>
<i>Belomys pearsoni blandus</i>	<i>Eothenomys custos hintoni</i>
<i>Callosciurus erythraeus hendeei</i>	<i>Ochotona cansa stevensi</i>
<i>Muntiacus rooseveltorum</i>	

### **Hylobates concolor Harlan. BLACK GIBBON.**

*Hylobates concolor* Harlan, Jour. Acad. Nat. Sci. Phila., 5, part 2, p. 231, pls. 9, 10, 1837—Borneo (sic!); Pocock, Proc. Zool. Soc. Lond., p. 736, 1927—"Hainan or the adjoining mainland of Tonkin, and not from Borneo"; Kloss, Proc. Zool. Soc. Lond., p. 124, 1929—"undoubtedly . . . Hainan."

D. & L. 1929-30.—Chapa, T. 8; Hoi Xuan, A. 1.

Although there have been reports of entirely black gibbons on the mainland of Tonkin, the only specimen previously recorded from there is the one forming the basis of the name *nasutus*, a synonym of *concolor*. This is said to have come from Along Bay, the exact locality being unknown. The present specimens, therefore, provide welcome information as to the exact district in which the typical form is found. Its range is evidently quite limited since the white-cheeked form, *leucogenys*, occurs not far inland and the buff-cheeked one, *gabriellae*, immediately to the southward.

The series from Chapa, which is fairly well inland, includes only two wholly black examples, both apparently males. One of these is a native skin without skull and the other had only preliminary

examination before being withdrawn by Delacour for mounting and exhibit at the French Colonial Exposition. The remainder are young and females in the buff phase quite indistinguishable from *leucogenys*. Their very bright, golden buff color is evidently somewhat different from the silvery gray shown by the female from Hainan described and figured by Pocock (Proc. Zool. Soc. Lond., pp. 169-180, pl. 5, 1905). It is possible, therefore, that they should be regarded as grading toward *leucogenys*.

The specimen from Hoi Xuan, which is much nearer the coast, is jet black throughout and in thick, almost woolly pelage somewhat as described for the original type of the species. The locality is but a short distance from Phuqui where Delacour (Kloss, 1929, p. 125) has reported the white-cheeked form. Collector's measurements of this specimen are: head and body 450; hind foot 150; ear 39. Although it was marked female by the collector, it is probably an adult male.

### ***Hylobates concolor leucogenys* Ogilby. WHITE-CHEEKED GIBBON.**

*Hylobates leucogenys* Ogilby, Proc. Zool. Soc. Lond., p. 20, 1840—"Siam."

*Hylobates henrici* Pousargues, Bull. Mus. Hist. Nat., Paris, p. 367, 1896—Lai Chau, Tonkin.

*Hylobates concolor leucogenys* Pocock, Proc. Zool. Soc. Lond., pp. 738-739, Sept., 1927; Kloss, Proc. Zool. Soc. Lond., p. 125, April, 1929—suggests Pak Lay, Mekong River, Laos, as type locality.

K.-R.—Lai Chau, T. 2 (ad. ♂, ad. ♀); Lao Fou Tchai, T. 1 (ad. ♀); Muong Moun, T. 1 (im. ♂); Muong Yo, L. 2 (im. ♂). WULSIN 1924.—Phong Saly, L. 5 (3 ad. ♀, 2 im. ♂).

D. & L. 1929-30.—Savannaket, L. 1 (♂); "Annam," 1; "Laos," 1.

From one of the least-known gibbons, this form now becomes one well represented by specimens of various ages and sexes. It is evidently common in northwestern Tonkin and northern Laos. The papers of Pocock and Kloss have gradually cleared up much of the uncertainty in the classification of this group and it remains for this series, with its topotypes of "*henrici*," to show that name to be an absolute synonym of *leucogenys*.

Adult males of this form are pure black with clear, white cheek-patches. Young males are much the same except that the white may be somewhat dingy and the hairs mostly have dark bases. A young female in the dark phase has light cheek-patches as in the male but they are very faintly tinged with buff and the black of the body shows a slight grayish mixture on the lower back and rump.

Adult females are very handsome animals with long full pelage, colored rich, golden, ochraceous buff, usually paler on the back and richer on the sides and limbs. In the change from the dark to the light phase the black appears to be retained longest on the breast, except of course on the crown, where it is permanent.

The changes in color which take place with growth in these gibbons are still imperfectly understood. A letter recently received from M. Delacour makes the following interesting contribution. "A male *Hylobates concolor* here [Clères, Seine Inferieure, France] since 1926 and about nine years old, suddenly turned gray this year. He is the gray of, say, a silver rabbit, with head, hands, and a point on the back black. Another one in Paris, about six years old, but of the *leucogenys* race, is also alike. I never saw one like them at liberty."

***Hylobates concolor gabriellae* Thomas. BUFF-CHEEKED GIBBON.**

*Hylobates gabriellae* Thomas, Ann. Mag. Nat. Hist., (8), 4, p. 112, 1909—Langbian, Annam.

*Hylobates concolor gabriellae* Pocock, Proc. Zool. Soc. Lond., p. 740, 1927; Kloss, *ibid.*, p. 125, 1929.

DEL. 1931-32.—Thateng, L. 2 (♀).

The identity of these females is substantiated by Delacour's statement (in litt.) that a male seen in captivity in Thateng had the yellowish or buffy cheeks characteristic of *gabriellae*.

***Pygathrix nemaeus* Linnaeus. DOUC LANGUR.**

*Simia nemaeus* Linnaeus, Mant. Plant., p. 521, 1771—Cochin China.

*Pygathrix nemaeus* Elliot, Rev. Primates, 3, p. 98, 1912; Thomas, Proc. Zool. Soc. Lond., p. 127, footnote, 1911.

REC. 1925-29.—Col des Nuages, A. 2; Napé, L. 3.

Although long known, this handsome monkey is seldom seen in collections. It is not represented in the most recent accessions from Indo-China. For the present, the generic separation of this species and its close ally *nigripes* from other langurs as proposed by Thomas may be accepted as a matter of convenience although it is evident that further study is needed.

***Pygathrix nigripes* Milne-Edwards. BLACK-FOOTED DOUC.**

*Semnopithecus nigripes* Milne-Edwards, Nouv. Arch. Mus. Hist. Nat., Paris, 6, p. 7, 1871—Saigon, Cochin China.

REC. 1925-29.—Djiring, A. 6.

Not represented in the most recent collections. The question of the specific or subspecific relationship between this form and *nemaea* and the status of *Presbytis nemaeus moi* Kloss have been discussed by Thomas (1928) and without further material nothing can be added.

**Pithecus germaini** Milne-Edwards. GERMAIN'S LANGUR.

*Semnopithecus Germani* Milne-Edwards, Bull. Soc. Philom., (6), 11, p. 8, 1876—Cochin China and Cambodia.

*Presbytis margarita* Elliot, Ann. Mag. Nat. Hist., (8), 4, p. 271, 1909—Langbian, Annam.

D. & L. 1929-30.—? Lao Bao, A. 4.

REC. 1925-28.—Cochin China, 3.

Four skins without skulls are in the collection obtained by the botanist Poilane. That these came from Lao Bao in central Annam, as stated on the labels, is doubtful. In Lowe's field catalogue, they were originally entered as from Memos, Cambodia, but this was later lined out and overwritten Lao Bao, Annam.

Pocock (Jour. Bomb. Nat. Hist. Soc., 32, p. 667, 1928) has suggested that this species is only a local representative of the *pyrrhus* series directly connected with *crepusculus* through the supposed form called *margarita*. After examination of the type of *margarita*, I find it difficult to accept this conclusion. This type is slightly grayer and softer-coated than most specimens of *germaini*, but it is essentially the same animal and quite distinct from *crepusculus*. Possibly a very slight subspecies of *germaini* may be differentiated on the Langbian Plateau, but until it is represented by more than the single type specimen of *margarita*, that name is best treated as a synonym.

**Pithecus pyrrhus argenteus** Kloss. SILVERY LANGUR.

*Presbytis argenteus* Kloss, Jour. Nat. Hist. Soc. Siam, 3, pp. 338-340, 1919—Lat Bua Kao, 40 miles west of Korat, east-central Siam.

K.-R.—Muong Mo, T. 1; Muong Yo, L. 4; Namu River between Muong Ngoi and Luang Prabang, L. 1.

D. & L. 1929-30.—Hoi Xuan, A. 3.

DEL. 1931-32.—Banphone, L. 2.

REC. 1925-29.—Phuqui, A. 3; Sambor, C. 3; Xieng Kuang, L. 1.

This is the palest of the *pyrrhus* series, the general color silvery gray with little or no tinge of brownish. It is most similar to *P. p.*

*crepusculus* of Tenasserim, but the color is paler, near the Smoke Gray of Ridgway. It is a slight form occupying northern and eastern Siam, northern Laos, and adjoining parts of Tonkin. A considerable series from various parts of this region has the common character of paleness as compared with any of the western forms occupying the region from northern Burma to Tenasserim and southwestern Siam.

In his recent study of the group, Pocock (Jour. Bomb. Nat. Hist. Soc., 32, pp. 667–675, 1928) followed the conservative course of referring several of the pale specimens of this form to *crepusculus*. With considerable additional material, I have reexamined all the specimens of the *pyrrhus* group in the British Museum with the very courteous cooperation of Mr. Pocock, and it now seems that the facts are best represented by the segregation of the northeastern material under a separate name. This apparently should be *argenteus* of Kloss which seems not to have been considered by Pocock.

If regarded as a linear series, running from dark color to light, the group is found to have *barbei* at one extreme and *argenteus* at the other, leaving *phayrei*, *shanicus*, and *crepusculus* as more or less definite stages between the two. Beginning with *barbei* in Upper Burma, we have a form with very dark brown upper parts and whitish, contrasted under parts; next is *phayrei*, as represented by upper Chindwin specimens, which is lighter brown, but still with sharply contrasted under parts; then *shanicus* with under parts less contrasted; then *crepusculus*, which is only slightly less brown than *shanicus* but has less contrasted under parts and lighter tail and legs; finally *argenteus*, grayish throughout including the under parts, which merge insensibly with the upper parts.

The type of *crepusculus* from Mount Mooleyit, Tenasserim, is a distinctly brownish specimen as compared with *argenteus* and is, in fact, only a shade lighter than *shanicus*, although it has a more grayish tail and less contrasted under parts. It stands in a somewhat intermediate position not only between *argenteus* and the brown forms of Burma, but it perhaps also connects with the darker ones (*flavicauda* and *atrior*) of south Tenasserim. The type of *wroughtoni* from "Pachebun" (=Petchaburi), Siam, unquestionably falls with *crepusculus* and, as noted by Pocock, is a "brownish specimen."

The name *argenteus* is unfortunate on account of the earlier *Semnopithecus argentatus* (Horsfield, Cat. Mamm. East India Co., p. 7, 1851). In a descriptive sense, however, it is most appropriate.



**Pithecus poliocephalus** Trouessart. GRAY-HEADED LANGUR.

*Semnopithecus (Lophopithecus) poliocephalus* Trouessart, Ann. Mag. Nat. Hist., (8), 8, pp. 271-272, pl. 7, Aug., 1911—Kai-Chin, northeastern Tonkin.

D. & L. 1929-30.—Cac Ba Island, Bay of Along, T. 6.

REC. 1925-29.—Hanoi Zoological Garden, T. 1.

Among the most valuable specimens obtained by Delacour and Lowe in 1930 are six well-prepared examples of this fine species, heretofore known only from the type in the Paris Museum and one zoological park specimen in the British Museum. They bear out the characters previously noted and figured. As indicated by the skulls, which differ only in minor characters, the species is obviously related only to *P. francoisi*, *P. laotum*, and *P. delacouri*, but it differs from any of these more than they do from each other. Its pelage is slightly coarser, the hairs of the back and sides are much longer, and the tail is not so heavily haired. Hence, while intergradation between the others is perhaps not unlikely, it is probable that *poliocephalus* is fully distinct. It is possible that it is confined to the islands of the Bay of Along, since northeastern Tonkin, from which the type was supposed to come, is in the region inhabited by *francoisi*.

In Lowe's field catalogue, the following note occurs regarding this species. "A curious weak and feeble sort of monkey, feeding on leaves of small bushes. When in danger, it takes refuge in large holes in the limestone hills on which it lives. It is tame, lives in small lots of eight to fifteen, and is very sociable. They are often seen all huddled together on the rocks. Its coloration is decidedly protective, if it has any enemies."

**Pithecus francoisi** Pousargues. TONKIN LANGUR.

*Semnopithecus Francoisi* Pousargues, Bull. Mus. Hist. Nat., Paris, p. 319, 1898—Long Tcheou, Kwangsi, China.

REC. 1925-29.—Backan, T. 1; Langson, T. 2; "Tonkin," 1.

Not obtained by the Kelley-Roosevelts or Delacour and Lowe expeditions.

**Pithecus laotum** Thomas. LAOS LANGUR.

*Pithecus laotum* Thomas, Ann. Mag. Nat. Hist., (9), 7, p. 181, Feb., 1921—Ba Na Sao, Mekong River, Laos.

Although the Kelley-Roosevelts Expedition passed through the region inhabited by this rare monkey, they failed to secure it.

***Pithecus delacouri* sp. nov.** DELACOUR'S WHITE-BACKED LANGUR  
(Plate X, facing p. 208).

*Type* from Hoi Xuan, northeastern Annam. No. 32.4.19.2. British Museum. Adult male. Collected Feb. 15, 1930, by J. Delacour and Willoughby Lowe. Orig. No. 1,878.

*Diagnosis*.—Allied to *P. francoisi* and *P. laotum*, but differing strikingly from both in having the rump and outer side of the thighs pure creamy white; white markings on head more restricted than in *laotum*, but more extensive than in *francoisi*. Fur soft and thick; mantle not highly developed; tail heavily haired throughout, individual hairs reaching a length of about 50 mm.

*Color*.—Body, arms, lower legs, and tail shining glossy black; lower back and rump with about two-thirds of the proximal part of the outer sides of the thighs pure creamy white with sharply defined boundaries between it and the adjoining black areas; head mainly black with a white patch behind each ear and a narrow grayish white line from the anterior base of the ear to the angle of the mouth; sides of neck and elongated hairs on cheeks dark sooty grayish; back of neck slightly tinged with brownish.

*Skull*.—Essentially as in *francoisi* and *laotum*, possibly a trifle larger.

*Measurements*.—Adult male and female measured by the collector: total length 1,400, 1,410; head and body 580, 570; tail 820, 840; hind foot 183, —; ear 40, 43. Skull of type: basal length 98.4; palatal length 35.4; postorbital constriction 49.3; zygomatic width 87; width of braincase 65; orbital width 69.3; upper toothrow to front of canine 36.8; without canine 28.9.

*Remarks*.—The discovery of this handsome monkey is one of the conspicuous results of Delacour's expedition of 1930. It is most appropriate, therefore, to have it bear his name.

The species belongs to the restricted group which includes *poliocephalus*, *francoisi*, and *laotum*. These in turn evidently are related to *P. potenzi* of the West Sumatran Mentawi Islands, a very distinct species not heretofore closely associated with any other. Although it differs strikingly in its pure white rump and thighs, *delacouri* seems otherwise to stand somewhat between *francoisi* and *laotum*, both of which are as yet represented in collections by very few specimens. Each stands out at present as well distinguished, but it is not difficult to believe that intergrades between

the three may be found later. In any case it is probable that they are quite local in distribution. *P. poliocephalus* may well be quite distinct, notwithstanding its superficial white on the rump and thighs suggesting that of *delacouri*, for its almost wholly light-colored head and its slender, short-haired tail set it apart.

Similar habits are reported for all these forms, all being somewhat terrestrial and rock-loving despite their long tails.

A convenient key for distinguishing them is as follows:

Rump and thighs pure black.

Head mainly black with a white stripe on lower cheeks and around ear. . . . . *francoisi*.

Head mainly white with a black crest and narrow frontal line. . . . . *laotum*.

Rump and thighs partly or wholly white or buffy.

Entire head and nape light golden buffy. . . . . *poliocephalus*.

Top of head black with white behind ears and on cheeks. . . . . *delacouri*.

### **Pithecus sp.?**

Among the mammals collected by F. R. Wulsin for the United States National Museum is a skin with skull of a wholly black langur labeled simply "French Indo-China." It is possible that this may represent still another form of the series including *potenziani*, *laotum*, *francoisi*, etc., but since it has no exact locality and since it is not supported by other specimens from the region, it seems best to leave its specific determination until better material may be available. The black langur of Java (*P. auratus* or *maurus*), which appears to be the only known species described as entirely black, has not been examined in this connection.

### **Rhinopithecus roxellanae** Milne-Edwards. GOLDEN MONKEY.

*Semnopithecus Roxellanae* Milne-Edwards, Comptes Rendus, Paris, 70, p. 341, 1870—Mouping, Szechwan, China.

*Rhinopithecus roxellanae* Milne-Edwards, Rech. Mamm., p. 233, pls. 36, 37, 1870-75; De Winton, Proc. Zool. Soc. Lond., p. 572, pl. 31, 1889.

K.-R.—Mountains near Mouping at altitude 7,500 feet, Szechwan, China, 10.

One fine adult male, various partly grown animals of both sexes, and two very small young, perhaps but a few days old, are in this series. As in the specimen described and figured by De Winton

(i.e.), the adult is more extensively ochraceous on the forehead and cheeks than in the original figure of Milne-Edwards. The hands also are bright-colored, but the color of the back and sides agrees more nearly with the figure of Milne-Edwards than with that of De Winton.

The newly born young, the coloration of which is doubtless undescribed, has thick, soft, and crenulate pelage, with the ears heavily tufted, but there is no indication of the color markings of the adult. Head, body, and legs Light Buff, the hairs of the head and back heavily tipped with deep brown slightly darker than Mummy Brown, the outer sides of the arms heavily and of the legs lightly washed with brownish drab; under parts and inner sides of arms and legs Light Buff without tipping; tail brownish drab, the hairs with light bases in its proximal half.

In partly grown specimens the head remains light-colored with dark-tipped hairs while the back soon acquires hairs with dark bases and broad, light, buffy tips. The rich ochraceous hues do not appear until late, at least not until the second and perhaps not until the third year.

The habits of these monkeys are very little known and about all that can be said is that they inhabit dense mountain forests. Evidence of this is found in the account of the taking of these specimens by Theodore Roosevelt from which the following may be quoted.<sup>1</sup>

"The undergrowth was dense—a tangle of vines and dead wood. The slope was steep. Soon we were in a bamboo jungle where the dust from dried leaves choked us as we gasped for breath. For better than an hour we stumbled upward without seeing a thing. Then we reached a razor-backed ridge down which we threaded our way, peering from side to side through blanket-like foliage.

"It seemed an almost hopeless mission when a native suddenly shrieked with excitement and pointed toward the tree-tops. We could see nothing but started scrambling ahead. Kermit was in front. When my eye caught motion among some branches to the right, I stopped and a second later glimpsed a yellow shape. It was impossible to get a shot with a rest, as the jungle was neck-high, so I whipped up my rifle and fired offhand. I was in luck, for the monkey fell crashing through the branches. It was a splendid dog-ape, with a mane of long, grayish-yellow hair down its back and the

<sup>1</sup>Trailing the Giant Panda, Scribner's, New York, pp. 172-173, 1929.

most brilliant orange on its belly. It was as big as an eight-year-old child. A second later I saw another and brought it down with two shots. Then Kermit started shooting just beyond me, and for a few minutes it sounded like a miniature battle as we fired at half-seen shapes fitting through the tree-tops."

**Presbytiscus avunculus Dollman. TONKIN SNUB-NOSED MONKEY.**

*Rhinopithecus avunculus* Dollman, Abstr. Proc. Zool. Soc. Lond., No. 106, p. 18, Mar. 26, 1912; Proc. Zool. Soc. Lond., p. 503, June, 1912—Yen-bay, Songkoi River, Tonkin.

*Presbytiscus avunculus* Pocock, Proc. Zool. Soc. Lond., p. 300, Mar., 1924.

REC. 1925-29.—Backan, T. 12.

Although Delacour and Lowe obtained a fine series of twelve specimens of this monkey at Backan, Tonkin, in 1925-26 (Thomas, 1928, p. 140), it is not represented in subsequent collections, and is otherwise known only from the type and one immature paratype.

**Macaca irus F. Cuvier. CRAB-EATING MACAQUE.**

*Macacus irus* F. Cuvier, Mém. Mus. Hist. Nat., Paris, 4, p. 120, 1818; Cabrera, Ann. Mag. Nat. Hist., (8), 6, p. 620, 1910—Sumatra.

K.-R.—Saigon, C.C. 1.

A single specimen of the usual coloration with grayish feet was obtained at Saigon by Theodore Roosevelt.

**Macaca mulatta Zimmermann. RHESUS MACAQUE.**

*Cercopithecus mulatta* Zimmermann, Geog. Gesch. Mensch., 2, p. 195, 1780—based on Pennant's "Tawny Monkey" from India.

*Inuus sancti-johannis* Swinhoe, Proc. Zool. Soc. Lond., p. 555, 1866—North Lena Island, Hongkong, China.

*Pithecus littoralis* Elliot, Ann. Mag. Nat. Hist., (8), 4, p. 250, 1909—Kuatun, Fukien, China.

*Pithecus brachyurus* Elliot, supra cit., p. 251—Island of Hainan, China.

*Pithecus brevicaudus* Elliot, Rev. Primates, 2, p. 216, 1912—substitute for *P. brachyurus*, preoccupied.

*Macaca siamica* Kloss, Jour. Nat. Hist. Soc. Siam, 2, p. 247, May, 1917—Me Ping rapids below Chiangmai, Siam.

*Macaca mulatta* Hinton and Wroughton, Jour. Bomb. Nat. Hist. Soc., 27, p. 668, July 31, 1921; G. M. Allen, Am. Mus. Novit., No. 429, pp. 1-3, 1930.

K.-R.—Muong Boum, T. 1; Muong Moun, T. 1; Nam Yu, L. 1.

REC. 1925-29.—Phuqui, A. 4.

WULSIN 1924.—Mekong River, L. 1; Vientiane, L. 2.



DELACOUR'S LANGUR (*Ptilocercus delacouri* sp. nov.)  
Type specimen



Comparison of the above material with specimens from northern India (Nepal and Kumaon) in the British Museum reveals no appreciable differences in color. The type of Elliot's *littoralis* was also examined in this connection with the same result, thus confirming the recent conclusion of Allen (*supra cit.*) that both *littoralis* and *sancti-johannis* are synonyms of *mulatta*. The same author finds *brevicaudus* Elliot of Hainan indistinguishable and gives little or no encouragement for the recognition of any of the names *tcheliensis*, *lasiotus*, and *vestitus* which, therefore, are much better in synonymy than elsewhere, at least until they can be fully defined on the basis of adequate material. *M. siamica* of northern Siam also belongs in this series and, until distinguishing characters are adduced for it, must be regarded as unrecognizable.<sup>1</sup>

***Macaca assamensis coolidgei* subsp. nov. COOLIDGE'S MACAQUE.**

*Type* from Hoi Xuan, Annam. No. 32.4.19.1. British Museum. Adult male. Collected Jan. 19, 1930, by J. Delacour and W. Lowe. Orig. No. 1,824.

*Diagnosis*.—Similar to *M. assamensis*, but tail decidedly shorter and coloration more grayish, especially on the arms and legs.

*Color*.—General color of body, shoulders, back, and rump Cinnamon Brown, brightest on shoulders and nape, the hairs dark Hair Brown basally and indistinctly annulated Cinnamon Brown and dusky apically; arms, legs and tail decidedly grayish in contrast to body color, the hairs pale Mouse Gray basally and slightly grizzled Hair Brown superficially; under parts and inner sides of arms and legs soiled whitish, the hairs self-colored.

*Skull*.—Essentially as in *assamensis*, possibly a little larger with slightly heavier dentition.

*Measurements*.—Type, measured by collectors: total length 805 (888, 900);<sup>2</sup> head and body 575 (560, 580); tail 230 (328, 320); hind foot 173 (168, 168). Adult male from Chapa, Tonkin: total length 815; head and body 600; tail 215; hind foot 167. Skull of type: condylo-basilar length 103; zygomatic width 95.8; width of brain-

<sup>1</sup>Since this was written a revision of the group by Pocock has appeared (Jour. Bomb. Nat. Hist. Soc., 35, pp. 530-551, 1932) in which *brevicaudus* and *siamica* are disposed as synonyms of *mulatta*, *sancti-johannis* is recognized with *littoralis* as synonym, and *tcheliensis* and *lasiotus* are also recognized as slight subspecies of *mulatta*.

<sup>2</sup>Measurements in parentheses are those of two typical *assamensis* from Darjeeling and Sikkim measured by the collector, C. A. Crump.



case 66.5; postorbital constriction 43.2; width across orbits 75.3; condyle to back of molars 54.5; upper toothrow including canine 50.3; molar series 27; basal length of canine 11.7.

*Remarks.*—The tail in this form is so much shorter than in typical *assamensis* that this character is readily apparent in the comparison of specimens without recourse to exact measurements. The grayish color of the limbs in contrast to the body also is very obvious. In other respects there is every evidence of close relationship to *assamensis* rather than to any other macaque. In fact, a single specimen from Muong Moun in northwestern Tonkin, although doubtless referable to *coolidgei*, may perhaps be regarded as tending slightly toward *assamensis*, the limbs being less grayish and the tail a little longer than in the series from eastern Tonkin.

Such variation as appears in the series of nine specimens from Chapa is away from *assamensis* rather than toward it; that is, it consists in extension of the grayish from the legs to the body rather than vice versa. In one specimen the entire upper parts behind the shoulders are sooty grayish without contrast with the legs. The skull of this specimen is also somewhat peculiar with a narrow basioccipital, small triangular nares, and weak molars; but material is not sufficient to determine what this may signify.

On the label of the type specimen the collector has made the following notation. "Bare skin of body and everywhere beneath fur pale blue, except region around sex organs and lower belly white; face and muzzle dark brown; forehead bluish flesh as low as half way across center of eyes; hands and feet brownish flesh."

Although the specimen selected as type was not collected by him, I have taken the opportunity to name it for Harold J. Coolidge, Jr., who was the leader of the Indo-Chinese section of the Kelley-Roosevelts Expedition and who is especially interested in the Primates.

*Specimens examined.*—Total 11, from the following localities: Chapa, T. 9 (D. & L.); Hoi Xuan, A. 1 (D. & L.); Muong Moun, T. 1 (K.-R.).

### **Macaca (Lyssodes) speciosa F. Cuvier. STUMP-TAILED MACAQUE.**

*Macacus speciosus* F. Cuvier, Hist. Nat. Mamm., pl. 47, 1825—no locality.

*Pithecius speciosus* Elliot, Rev. Primates, 2, pp. 190-193, 1912—"Burma and Cochin China, etc."

*Macacus arctoides* Geoffroy and various authors.

*Macacus harmandi* Trouessart, Le Natural., p. 10, 1897—mountains between Cambodia and Siam.

*Lyssodes speciosus* Pocock, Proc. Zool. Soc. Lond., pp. 1497, 1571, 1926—Burma.

K.-R.—Muong Moun, T. 2.

D. & L. 1929-30.—Chapa, T. 3.

REC. 1925-29.—Col des Nuages, A. 1.

The stump-tailed macaques of Tonkin, especially those from Chapa, are in general less reddish brown than those from north-eastern India (Naga Hills) and Tenasserim, but seem best referred to *speciosa*, at least until definite localities are fixed for several names in the group. An adult male from Muong Moun is decidedly browner than examples from Chapa and also differs in having the top and sides of the head distinctly grizzled, but without more material than is at hand as this is written, any attempt at separation is scarcely justified. Comparison also has been made with the type of *Pithecus pullus* Howell, of Fukien, which as shown by G. M. Allen (Am. Mus. Novit., No. 429, pp. 3-4, 1930) is a synonym of *M. s. melli* Matschie. Material in hand differs from this type in less brownish and less uniform coloration, the hairs mostly having some degree of annulation. The distinctions between *speciosa* and *rufescens* Anderson, both so far without definite localities, apparently need clarification. If these should prove to be the same, a form from northern Siam and Tonkin might be recognized under the name *harmandi*.

As to the use of the name *speciosa* instead of *arctoides*, about which there has been some question, I am much inclined to agree with Elliot and Pocock. At the time *speciosa* was published it was by no means unidentifiable from the contemporary standpoint. As the earliest name for one of several forms in a restricted group, it should by all means be applied to one of them. The rejection of such names tends to loose nomenclatural practice in which individual opinion is given rein far beyond what is desirable. Although no code has done so, it would be quite possible to formulate a rule which would cover cases of this kind and contribute to uniformity of usage.

**Nycticebus bengalensis cinereus** Milne-Edwards. ASHY SLOW LEMUR.

*Nycticebus cinereus* Milne-Edwards, Nouv. Arch. Mus., Bull., 3, p. 11, pl. 3, 1867—Siam and Cochin China.

*Nycticebus cinereus* Lyon, Proc. U. S. Nat. Mus., 31, p. 532, 1906—Bangkok, Siam, suggested as type locality.

*Nycticebus cinereus* Kloss, Jour. Nat. Hist. Soc. Siam, 2, p. 77, 1906; *ibid.*, p. 239, 1917—specimens from Koh Lak, Siam.

*Nycticebus coucang cinereus* Kloss, *supra cit.*, 3, p. 51, 1913—Wang Pong, Siam.

*Nycticebus bengalensis* Thomas, Proc. Zool. Soc. Lond., p. 43, 1927.

K.-R.—Vientiane, L. 1.

D. & L. 1929-30.—Near Huê, A. 1; Lao Bao, A. 1.

DEL. 1931-32.—Pakse, L. 1; Thateng, L. 1.

REC. 1925-29.—Xiang Kuang, L. 1.

A fine adult male was obtained by R. E. Wheeler at Vientiane. In this specimen the usual "frosting" on the posterior half of the body has been worn away, leaving this part a bright and nearly clear Russet. This tone is carried with lighter mixture down the hind legs and over the proximal part of the fore legs whence it extends across the under parts, thus pervading the entire animal except on the head, throat, forearms and feet. The same pervading color-tone is seen in the specimen from Xiang Kuang, referred by Thomas to *bengalensis* (1927, p. 43), and also in an incomplete skin in the British Museum from the vicinity of Raheng, Siam, this last from the type region of *cinereus*. In two specimens from the Naga Hills, Assam, representing *bengalensis* (Thomas, Jour. Bomb. Nat. Hist. Soc., 28, p. 433, 1922) the prevailing tone of color is cinnamon rather than russet, which gives the general effect of a much duller-colored animal. Therefore it may be possible to recognize *cinereus* as a subspecies of *bengalensis* occupying Siam and southern Laos. Aside from this slight color difference, there appears to be little or no distinction.

A cotype of *N. cinereus* is in the British Museum, but the skin, having been exposed as a mounted specimen, does not offer color characters except as to distribution of markings. There is evidence of a dark marking at the upper anterior base of the ear and another above the eye, but neither is definitely connected with the median dark line which reaches the occiput. No attempt has been made to determine the relationships of *N. tenasserimensis* Elliot 1913 and *N. incanus* Thomas 1921 (Lower Pegu, Burma), both of which may be subspecies of *bengalensis*.

### ***Nycticebus pygmaeus* Bonhote. PYGMY SLOW LEMUR.**

*Nycticebus pygmaeus* Bonhote, Abstr. Proc. Zool. Soc. Lond., 1907, p. 2, Jan. 22, 1907; Proc. Zool. Soc. Lond., pp. 4-5, figs. 1, 2 (skull), pl. 2 (col.), 1907—Nhatrang, Annam.

- K.-R.—Lai Chau, T. 1; Phong Saly, L. 1; Saigon, C.C. 1.  
D. & L. 1929-30.—Hoi Xuan, A. 1; Lung Lunh, A. 1; Then Loa, A. 1; Thy-ba, A. 1.  
DEL. 1931-32.—Thateng, L. 1.  
REC. 1925-29.—Huê, A. 1; Kontoum, A. 2; Phuqui, A. 1; Thai Nien, T. 1.

This very distinct species is now shown to range from Cochin China northward through Annam to southern Laos. In most of this region it seems to occupy territory from which the larger *bengalensis* type is excluded, but both have been recorded from Huê, and it is evident that their ranges overlap in Laos. The small size and relatively uniform color are sufficient for ready recognition of the species without recourse to other pronounced characters. However, the statement in the original description that there is "no sign of any dark line down the back" does not hold and, as noted by Thomas, it is probable that the color of the type was somewhat altered by preservative. In recent specimens, especially those in which the superficial "frosting" is worn away, a dark line, Russet to Mars Brown in color, runs from the shoulders to the lumbar region and is well distinguished from the surrounding Tawny. Except for the absence of any indication of this line, the colored figure published with the original description is a good representation of the animal.

**Rousettus leschenaulti** Desmarest. **LESCHENAULT'S FRUIT BAT.**

*Pteropus leschenaulti* Desmarest, Encycl. Meth., Mamm., 1, p. 110, 1820—Pondicherry, northern India.

REC. 1925-29.—Backan, T. 1.

This bat is known from Nepal to southern China (Amoy). Therefore, the above record, although apparently the only one from Indo-China, has no especial significance.

**Pteropus vampyrus malaccensis** Andersen. **MALACCA FRUIT BAT.**

*Pteropus vampyrus malaccensis* Andersen, Ann. Mag. Nat. Hist., (8), 2, p. 368, Oct., 1908—Kuala Tembeling, Pahang, Malay Peninsula.

REC. 1925-29.—Huê, A. 2; Phuquoc Island, C. 3.

These are the easternmost records of this typically Malayan bat. It is not represented in the most recent collections.

**Cynopterus sphinx** Vahl. **SPHINX FRUIT BAT.**

*Vespertilio sphinx* Vahl, Skr. Nat. Selsk., 4, Heft 1, p. 123, 1797—Tranquebar, India.

K.-R.—Muong Mo, T. 11; Phouc Mon, Quangtri, A. 1.

REC. 1925-29.—Huê, A. 2; Kontoum, A. 1; Siem Reap, C. 1; Tay Ninh, C.C. 7.

These include the most northeastern records for the species, which is mainly Indian and East Indian. All the Tonkin specimens are in the dark color phase and average large in size, the forearm being 70 or more. The Phouc Mon specimen is smaller with a forearm of 66.

### ***Megaerops ecaudatus* Temminck.**

*Pachysoma ecaudatum* Temminck, Monog. Mamm., 2, p. 94, 1837—Padang, Malay Peninsula.

REC. 1925-29.—Dakto, A. 3.

Although long known, this bat is still very rare and the specimens recorded by Thomas (1927, p. 44) from Annam are not only the first for Indo-China, but are among the very few examples preserved in museums.

### ***Eonycteris spelaea* Dobson.**

*Macroglossus spelaeus* Dobson, Proc. As. Soc. Beng., pp. 105-106, May, 1871; Jour. As. Soc. Beng., 40, p. 261, pl. 10, figs. 3, 4, June, 1871—Farm Caves, Moulmein, Lower Burma.

K.-R.—Pa Ham, south of Lai Chau, T. 6.

DEL. 1931-32.—Thateng, L. 8.

The Tonkin record is the northernmost for the species, the type being from Moulmein and others from Siam and Malaysia.

### ***Rhinolophus lepidus* subsp.?**

K.-R.—Nguluko, Yunnan 3 (sk.), 8 (alc.).

These bats were taken at the same time and place as those referred to *R. affinis tener* (p. 216) and like them do not seem referable to any species previously recorded from China. Apparently they are closely related to the series which includes *lepidus* (Indian Peninsula), *monticola* (Masuri, Punjab), *refulgens* (Malay Peninsula), and *shortridgei* (Upper Burma). As judged by descriptions, they do not agree exactly with any of these, but for the present it does not seem advisable to add further names, since the material representing those already given is limited and their geographic ranges cannot be determined with any certainty.

The forearm in the present series is unusually long for a bat of such small bodily size. It varies from 42.5 to 45.5 although the skulls are no larger than in bats having a much shorter forearm. The skulls are slightly smaller and have a shorter tooththrow than in *lepidus* and *shortridgei*, but they do not especially approach *szechwanus* in which the skull is not only smaller but differs in the shorter palatal bridge. Specimens from Suifu, Szechwan, doubtfully referred by Howell (Proc. U. S. Nat. Mus., 75, p. 12, 1929) to *szechwanus* are said to have the forearm averaging 41.8 and perhaps may belong to the form under consideration. Measurements of one of the skulls from Nguluko are as follows: condyle to front of canine 14.5; zygomatic width 7.6; mastoid width 8.1; interorbital constriction 2.4; width of nasal swellings 4.2; length of bony palate (palatal bridge) 3; upper tooththrow to front of canine 5.8.

### **Rhinolophus blythi calidus Allen.**

*Rhinolophus blythi calidus* Allen, Am. Mus. Novit., No. 85, p. 1, Aug. 28, 1923—Yenping, Fukien, China.

K.-R.—Muong Moun, T. 1 (sk.).

REC. 1925-29.—Tay Ninh, C.C. 5.

Among the large number of *Rhinolophi* collected in Tonkin, only one specimen seems referable to the so-called "*pusillus* series." This agrees in color, size, and cranial characters with material from Fukien representing *R. b. calidus*. Specimens from Cochin China referred to *pusillus* (*R. minor* of Andersen, 1905) by Thomas are doubtless closely related if not identical. In 1905, Andersen gave Java, Siam, and Darjeeling as the range of *R. minor* (= *pusillus*), but in 1918, when he named *blythi* and *szechwanus*, he had evidently concluded the mainland forms to be separable. The distinctions are not very clear at present and it might be preferable, at least until suitable material from Java is obtained, to regard all the forms as races of *pusillus*. However this may be, the Tonkin specimen agrees with *calidus*, and that name may be used as proposed by Allen.

### **Rhinolophus blythi szechwanus Andersen.**

*Rhinolophus b. szechwanus* Andersen, Ann. Mag. Nat. Hist., (9), 2, pp. 376-377, Oct., 1918—Chungking, Szechwan, China.

Herbert Stevens made considerable collections within the range of this form, but failed to obtain it. The opportunity may be taken, however, to record the measurements of the type specimen which were not specifically given with the original description.

These measurements were very carefully taken, transcribed and forwarded by Miss Jane St. Leger to whom grateful acknowledgment is made. They are as follows: head and body 36; tail 18; foot 6; ear 14 (from collector's label). Forearm 38.9; lower leg without foot 16 (from dried skin). Skull: total length occiput to anterior base of canine 15; basion to gnathion 12.3; zygomatic width 7.2; antorbital width 5; interorbital constriction 2.1; width of braincase 7.5; width between canines 1.8; length of bony palate (palatal bridge) 2; width of palate 3; upper toothrow to front of canine 5.6.

### **Rhinolophus affinis macrurus Andersen.**

*Rhinolophus affinis macrurus* Andersen, Proc. Zool. Soc. Lond., p. 103, 1905—Taho, Karennee, Burma.

K.-R.—Muong Boum, T. 1; Muong Moun, south of Lai Chau, T. 8 (sk.), 3 (alc.).

REC. 1925-29.—Langson, T. 5 (as *R. affinis*).

A topotype of *R. a. macrurus* loaned by the United States National Museum shows detailed agreement with the material from Tonkin. Comparison with specimens in the British Museum representing *himalayanus* indicates only slight average difference in size and the distinction of two forms is rather difficult.

The length of the forearm (51.5-54) serves to distinguish this bat from all the other *Rhinolophi* of the region except *R. pearsoni*, which has somewhat longer, more "woolly" pelage. A convenient distinction between the skulls is found in the bony palatal bridge which is decidedly longer in *pearsoni* (about 3.8) than in *macrurus* (about 2.3).

Specimens from the island of Hainan representing *R. hainanus* (J. A. Allen, Bull. Am. Mus. Nat. Hist., 22, p. 482, 1906) seem quite indistinguishable from *macrurus*.

### **Rhinolophus affinis tener Andersen.**

*Rhinolophus affinis tener* Andersen, Proc. Zool. Soc. Lond., p. 103, pl. 3, fig. 12, 1905—Pegu, Lower Burma.

K.-R.—Ngulukko, Yunnan 10 (sk.), 18 (alc.).

Horseshoe bats of the *affinis* type have not been recorded heretofore from China and the considerable distance in latitude and climatic conditions between Yunnan and Lower Burma leads to some doubt that the form called *tener* is quite the one under consideration. The above-mentioned series, however, agrees in most particulars

with the description of *tener* and, in the present state of knowledge, it seems the part of conservatism to add no further names to a group already overburdened. Moreover, the type of *tener* appears to be the only known specimen and it cannot be assumed that others from the same region would not show some variation in dimensions.

The Yunnan specimens disagree with the description of *tener* in having somewhat smaller teeth and longer metacarpals. The forearm also is longer, but with only one specimen of typical *tener* considered, this seems unimportant.

The forearms are nearly or quite as long (51–53.5) as in *R. a. macrurus*, but the skulls are very much smaller and scarcely exceed those of *R. rouxi* to which they show very great general similarity. Relationship to *rouxi*, however, is excluded by the long second phalanx of the third digit and by other characters.

Measurements of a Yunnan specimen compared with those of the type of *tener* (in parentheses) are as follows: forearm 52.8 (50); third metacarpal 38.6 (35.8); first phalanx 16.6 (14.3); second phalanx 25.6 (25); fourth metacarpal 41.1 (37.1); first phalanx 11.6 (10); second phalanx 15.9 (14.3); fifth metacarpal 43 (38); first phalanx 14.3 (11.8); second phalanx 10.7 (13.3); tail 24 (23); lower leg 21.3 (23); foot 10.3 (12). Skull: total length 21 (21.9); width of braincase 9.3 (9); zygomatic width 10.5 (10.5); supraorbital length 5.3 (5.2); width of nasal swellings 5.3 (5.7); upper teeth excluding incisors 7.8 (8.7); lower teeth 8.8 (9.2).

### **Rhinolophus pearsoni chinensis Andersen.**

*Rhinolophus Pearsoni chinensis* Andersen, Ann. Mag. Nat. Hist., (7), 16, p. 289, Sept., 1905—Kuatun, Fukien, China.

K.-R.—Chapa, T. 2; Muong Mo, T. 1; Muong Moun, T. 1.

D. & L. 1929–30.—Chapa, T. 1 (alc.).

Since they agree in having a short tibia (25.5–26.5), these bats are doubtless best referred to *chinensis*, although in other characters they differ but little or not at all from typical *pearsoni*. The status of *R. yunnanensis* from Hotha, Yunnan, is still uncertain and specimens from that region, as well as series from Fukien, would be welcome. The name *chinensis* was based on a single specimen and, later, one other from southern Burma was referred to it by Andersen (Ann. Mus. Civ. Stor. Nat. Gen., (3), 3, p. 477, Oct., 1907).

### **Rhinolophus subbadius Blyth.**

*Rhinolophus subbadius* Blyth, Jour. As. Soc. Beng., 13, part 1, No. 150, p. 486, 1844—Nepal.



K.-R.—Muong Moun, T. 3 (sk.), 2 (alc.).

These appear to include the only extant modern skins and skulls of this rare bat, smallest member of the genus *Rhinolophus*. The type, from Nepal, is reputed to be in the Indian Museum at Calcutta, but has had no recent examination. The type of *R. garoensis* from the Garo Hills is also in the same museum. In 1905 (Proc. Zool. Soc. Lond., p. 129, 1905) Andersen placed *garoensis* as a synonym of *subbadius*, apparently with good reason, but in 1918, without explanation, he dropped *subbadius* and used only *garoensis*. Evidence for this change may have been published, but it has not come to my notice, and I continue to use *subbadius*.

The specimens in hand are rather bright-colored, the hairs with light bases and cinnamon tips. The under parts are paler anteriorly and more like the back posteriorly and laterally. Measurements of a specimen taken by R. E. Wheeler are: total length 46; tail 11; hind foot 7. The forearm in the dry skin measures 32.7; lower leg 13; ear from meatus 10.2; width of tragus 4. Measurements of the skull are as follows: length to canine 14.4; mastoid width 6.6; width of braincase 6.4; zygomatic width 6.7; width of nasal swelling 3.9; mandible 9; upper teeth 5.5. These measurements indicate an animal even smaller than that described as *subbadius* and *garoensis*. A single skin without skull from southern Yunnan (near Mongtze?) in the British Museum agrees with our specimens in size and color and doubtless belongs to the same species.

### ***Rhinolophus malayanus* Bonhote.**

*Rhinolophus malayanus* Bonhote, Fasciculi Malayenses, Zool., 1, p. 15 (author's ed.), July, 1903—Biserat, Jalor, Malay States.

K.-R.—Muong Moun, T. 13 (sk.), 1 (alc.).

Specimens of the species represented by this series failed to be included among those taken to London for direct comparison with Andersen's material. Their identification as *malayanus*, therefore, is provisional. Among the other *Rhinolophi* of the collection, they are marked by the great contrast in the color of the upper and under parts. In nearly all examples there is a well-marked light area on the breast in which the hairs are wholly dull whitish without any dark tipping. There is also a tendency to the formation of a whitish area in the interorbital region just behind the lancet, and the hairy front margin of the ears is whitish. The forearms measure 40–42. The skulls are slender, with narrow braincases, short palates and rather well-developed nasal swellings.

**Rhinolophus sp.**

K.-R.—Muong Mo, T. 3 (sk.); Muong Moun, T. 1 (sk.), 2 (alc.).

These bats evidently belong in the series which Andersen has indicated as related to *R. borneensis* and *R. malayanus*. They differ from *malayanus* (antea) in larger size, darker color, and more slender skulls. The forearms measure 42.5–45.8 and the total length of the skull averages about 19.5, with a width of braincase of 8.5. The color is dark cinnamon brown above and below, the light bases of the hairs almost wholly concealed.

The great development of the nasal swellings shown in *R. stheno* is somewhat less in *malayanus* and in the present series perhaps still less, but in general robustness of the skull these specimens agree with *sthenos* somewhat better than with *malayanus*. Since a form more nearly agreeing with *malayanus* is also found at the same locality in Tonkin, it is possible that the present one is a northern representative of the larger Malayan form *sthenos*, the inflated nasals of the latter being a local rather than a general character. Until the incompleting work of Andersen on the entire genus is fully reviewed, however, conclusions of this sort can be regarded as little more than suggestive and the addition of further names is not desirable.

**Rhinolophus episcopus caldwelli** Allen.

*Rhinolophus episcopus caldwelli* G. M. Allen, Am. Mus. Novit., No. 85, p. 3, Aug. 28, 1923—Yuki, Fukien, China.

K.-R.—Muong Moun, T. 1 (sk.).

D. & L. 1929–30.—Chapa, T. 3 (alc.).

Although slightly larger than the heretofore unique type of this form, these specimens may be referred to it with considerable confidence. The single skin agrees with the type of *caldwelli* in being brighter-colored than *episcopus* and in having the breast and throat dull whitish without dark-tipped hairs. The forearms measure 43.3, 43.7, 44, 45.3 against 43 in the type of *caldwelli* and 47.5 in *episcopus*. The skulls indicate but little difference in size between the two forms, but the teeth appear to average slightly smaller in *caldwelli*. The species is readily distinguishable from all its congeners of the region except *macrotis* by the long palate and anteriorly narrowed skull.

**Rhinolophus macrotis siamensis** Gyldenstolpe.

*Rhinolophus macrotis siamensis* Gyldenstolpe, Kungl. Svenska Vetensk. Handl., 57, No. 2, Mamm. II, p. 12, 1916—Doi Par Sakeng, northwestern Siam.

K.-R.—Muong Moun, T. 2 (sk.).

Two specimens of horseshoe bats in the collection may be assigned to *R. m. siamensis*, although their measurements definitely exceed those given for the unique type of that form. Comparison with published measurements indicates that they are almost exactly intermediate between *macrotis* and *siamensis*. The forearms are 38.39, against 41–43 for *macrotis* and 36.1 for *siamensis*. The upper toothrows are 5.7, 5.8, against 6.3 for *macrotis* and 5.3 for *siamensis*. The species appears to be rare or difficult to obtain and the total number of specimens recorded of all forms is quite small, so the extent of variation in size is but imperfectly known. It seems plain, however, that an eastern form may be differentiated which averages smaller than *macrotis* of the northwestern Himalayas and, at least until much more material is available, the name *siamensis* may best be used for it.

The specimens above recorded fulfill the prediction made by Andersen in 1907 (Ann. Mus. Civ. Stor. Nat. Gen., (3), 3, p. 27) when in describing *R. m. dohrni* from Sumatra he said: "*Rh. macrotis* was hitherto only known from the Himalayas (Masuri, Nepal). It is therefore of much interest now to see the range of this species extended to Sumatra. After this there can, of course, be no doubt that it will also be found in Indo-China and the Malay Peninsula."

### **Hipposideros larvatus** Horsfield.

*Rhinolophus larvatus* Horsfield, Zool. Res. in Java, unpagcd, 1824—Java.

K.-R.—Muong Boum, T. 12 (sk.), 2 (alc.); Muong Moun, T. 16 (sk.).

These agree with specimens from Tenasserim and Upper Burma referred to this species by Wroughton (Jour. Bomb. Nat. Hist. Soc., 23, p. 704, May, 1915). They also agree in color with specimens from Java, the type locality, but are slightly larger, with forearms 56–58 instead of 54–56, and their skulls are a little larger. Hence it is not improbable that a northern form might be differentiated, but what name it should bear is uncertain.

Two color phases and various gradations between them are represented in the very fine series of skins collected by Hendee and Van Tyne. In one the terminal color of the hairs is Cinnamon Brown and in the other it is blackish Mummy Brown.

### **Hipposideros gentilis** Andersen.

*Hipposideros gentilis* Andersen, Ann. Mag. Nat. Hist., (9), 2, pp. 380–381, Oct., 1918—Thayetmyo, Burma.



OWSTON'S CIVET (*Chrologale oustoni* Thomas)

From a painting by Walter A. Weber



K.-R.—Muong Mo, T. 6 (sk.); Muong Moun, T. 9 (sk.), 1 (alc.).  
D. & L. 1929-30.—Hoi Xuan, A. 4 (alc.).

These agree fairly well with the type and others in the British Museum doubtless identified by the original describer. Externally they are scarcely distinguishable from the Indian *R. fulvus*, but the relative size of the small first lower premolar serves to place them. The forearms range in length from 38 to 42 and the skull length (canine to condyle) from 15.2 to 15.5. These measurements are almost exactly those given for typical *gentilis*, although the forearm comes within the range (40-43) given *H. g. sinensis* from Fukien. At most, this form can differ from *gentilis* only in slightly greater average size and its recognition seems scarcely justified by the small amount of material now available.

### **Hipposideros cineraceus Blyth.**

*Hipposideros cineraceus* Blyth, Jour. As. Soc. Beng., 22, p. 410, 1854—  
Punjab, India.

K.-R.—Lai Chau, T. 1 (sk.); Muong Moun, T. 3 (sk.); Phong Tho, T. 1 (sk.).

Apparently this is the smallest species of *Hipposideros*. The average length of the forearm in these five specimens is 33.8 (32.8-34.8). They were overlooked when material was selected for comparison in the British Museum, but their dimensions seem to leave little room for doubt as to their identity.

### **Hipposideros diadema masoni Dobson.**

*Phyllorhina Masoni* Dobson, Jour. As. Soc. Beng., 41, p. 338, 1872—Moulmein, Tenasserim.

*Hipposideros diadema masoni* Andersen, Ann. Mus. Civ. Stor. Nat. Gen., (3), 3, p. 6, 1907.

D. & L. 1929-30.—Lao Bao, A. 1.

Until recently, the restricted *diadema* group has been recorded chiefly from insular localities, the only mainland form *masoni* being known from three specimens only from Tenasserim and Johore (Andersen, l.c.). A record from Annam, therefore, constitutes a considerable extension of the range of the group. The specimen, collected by the botanist Poilane, is in rather poor condition, mummified after temporary immersion in preservative. The skull is closely similar to that of one from Java, but the rostral prominences are slightly more swollen.

**Hipposideros armiger** Hodgson.

*Rhinolophus armiger* Hodgson, Jour. As. Soc. Beng., 4, p. 699, 1835—central Nepal.

K.-R.—Muong Boum, T. 15 (sk.), 2 (alc.).

REC. 1925-29.—Backan, T. 1; Ngai Tio, T. 1.

D. & L. 1929-30.—Chapa, T. 2 (sk.), 78 (alc.).

The color in this series agrees quite closely with that of specimens from central China rather than with those from Fukien which Allen (Am. Mus. Novit., No. 85, p. 4, 1923) has given separate recognition as *H. a. sumnhoi*. There is considerable variation, however, and dichromatism seems to be indicated.

**Hipposideros pratti** Thomas.

*Hipposideros pratti* Thomas, Ann. Mag. Nat. Hist., (6), 7, p. 527, 1891—Kiating, Szechwan, China.

D. & L. 1929-30.—Chapa, T. 36 (alc.), 2 (sk.).

Although not taken by previous collectors in the same region, this bat was found in numbers by Delacour and Lowe in 1930. The series includes both adult males and females as well as younger examples and serves to clear up uncertainties in regard to sexual differences which have been standing since the species was originally described from a single female some forty years ago.

In recent years the only important notes on the species are those of Howell (Proc. U. S. Nat. Mus., 75, p. 13, 1929), who records thirty specimens mainly from Hunan and Fukien, China. He is able to add considerable data as to color, size, and detailed distinctions from *H. armiger*, but his material included only one male and that apparently not fully mature.

The adult males of the present series have enormous, wing-like, fleshy expansions on either side of the frontal sac, indicating a sexual difference far greater than has been suspected (fig. 29). These expansions reach a combined width of 28 mm. and when erected their points stand some 23 mm. above the nostrils. The V-shaped indentation, at the bottom of which is the frontal sac, has a length on each side of 8 mm.

In the adult females the expansions are similar in form but very much smaller, more densely hairy, and relatively inconspicuous. Their combined width is about 14 mm. and the height above the nostrils 13 mm. Some of the males examined have the expansions no larger than in the females and, although the alcoholic specimens

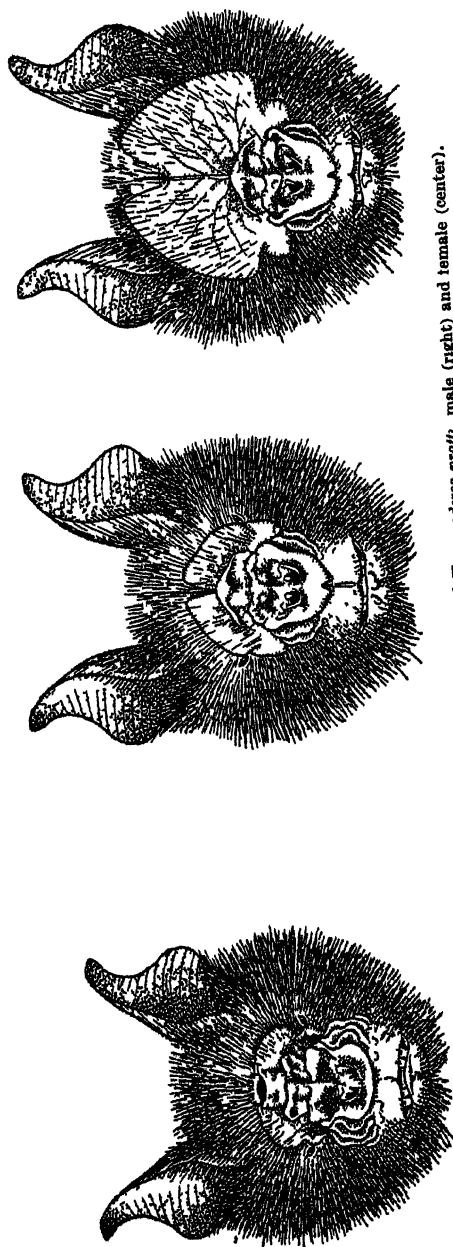


FIG 29 Nose leaves of *Hippoanderos armiger*, male (left) and *Hippoanderos pretti*, male (right) and female (center).  
Natural size



do not show especial signs of immaturity, they are perhaps to be regarded as young enough to be undeveloped. The few males heretofore recorded evidently have been of this character. That the extreme development is seasonal may also be possible. Somewhat similar sexual differences have been observed and figured in *H. armiger* (Dobson, Monog. As. Chirop., p. 64, figs. a-b, 1876) and other species of *Hipposideros*, but the degree of divergence shown by *H. pratti* is far beyond any of these. In fact it may be said that the development of facial dermal appendages in this species exceeds that of any other member of the Chiroptera.

The principal cranial characters distinguishing *pratti* from *armiger* are obviously related to the enlargement of the external dermal growths. These are the widened nares and the broad, depressed and concave rostrum with the consequent alteration of the entire dorsal outline of the skull.

As noted by Andersen (Ann. Mag. Nat. Hist., (7), 17, p. 35, footnote, 1906), *H. pratti* is perhaps related to *H. leptophylla*, a species from the Khasi Hills, Assam, India, with skull unknown, but described as having the front border of the horseshoe notched as in *pratti* and in general similar except that the animal is smaller in size. Another obviously close relative is *H. lylei* (Thomas, Ann. Mag. Nat. Hist., (8), 12, p. 88, 1913), also described as smaller than *pratti*. The type locality of *lylei* is the vicinity of Chiangmai, northern Siam, which is relatively near the region from which the present series comes. Its forearm is given as 78, which is somewhat shorter than in the smallest (82.3) specimens in our series. Further specimens have been referred to *lylei* from the Shan States, Burma (Riley, Jour. Bomb. Nat. Hist. Soc., 22, p. 715, 1914), but although it is intimated that specimens larger than the type may have been included, no measurements are given. Published comparisons of *lylei* and *pratti*, therefore, are confined to those of the respective type specimens, neither of which I have examined. Average measurements of forearms in the series from Tonkin are as follows: ten adult males 86.3 (85.2-87.8); ten young males 85.9 (83.7-89.5); ten adult females 85.2 (82.3-88.4). These are slightly less than the average of 88.5 obtained by Howell for fourteen specimens from southern China.

***Trienops wheeleri* sp. nov. WHEELER'S TRIDENT BAT.**

*Type* from Muong Moun, Tonkin. No. 32,236 Field Museum of Natural History. Adult female. Collected March 21, 1929, by R. E. Wheeler. Orig. No. 80.

*Diagnosis*.—Size small (forearm 42), much smaller than *T. persicus* and not quite equaling the dimensions given for *T. furcula* of Madagascar. Somewhat similar to *T. tricuspidatus* of the Solomon Islands, having the same exerted tail-tip, the same small ears, and very nearly the same nasal appendages, but differing in color and in having a more depressed rostrum and less inflated nasal region. Zygoma with a posterior vertical expansion well developed, but not equaling that of *T. persicus*; upper canines with anterior secondary cusps slightly higher than the posterior ones, thus differing from *T. persicus* in which the reverse condition occurs.

*Color*.—Upper parts brownish (Bister) or sooty (probably representing two color phases), the hairs broadly white basally; under parts pale Snuff Brown, the hairs slightly lighter basally than terminally.

*Membranes and appendages*.—Wings and tail about as in *Hipposideros*; wings and interfemoral membrane from middle of metatarsus above base of toes; terminal phalanges of fourth and fifth fingers definitely bifurcate; foot with a narrow, well-differentiated sole; tail with its tip slightly exerted beyond interfemoral membrane. Ears short and when laid forward barely reaching to the nostrils; outer border of ear excavated in upper half and expanded in lower. Nose leaves double, at least laterally; a thickened heart-shaped area behind the nostrils thinly beset with stiff hairs and behind this an erect semilunate process rising from a thin membranous base and divided into three slightly rugose parts, a median subcylindrical one in the center and a subtriangular one on each side, the upper border thus having a tridentate appearance with the median point slightly higher than the lateral ones.

*Skull*.—General shape of skull much as in *Hipposideros*; rostrum depressed below level of braincase; zygomata somewhat converging anteriorly; an upright plate from the posterior half of the zygoma in general similar to that in *T. persicus* but its base occupying a smaller proportion of the zygoma; nasal region more inflated than in *Hipposideros* but less than in *T. persicus* and *T. tricuspidatus*; basioccipital relatively wide, much as in *Hipposideros*; upper incisors indistinctly bifid; upper canines with short anterior and posterior secondary cusps, the anterior slightly higher than the posterior.

*Measurements*.—Average of six adults: total length 84; tail 39; hind foot 8; forearm (dry) 41.6. Adult in alcohol: forearm 42; second finger, metacarpal 32; third finger, metacarpal 31.5; first

phalanx 15; second phalanx 21; fourth finger, metacarpal 31; first phalanx 12; second phalanx 7.5; fifth finger, metacarpal 28; first phalanx 12.5; second phalanx 10; tibia 18; hind foot 9; calcar 10. Skull of type: greatest length 15; condyle to front of canine 13; zygomatic width 7.4; mastoid width 7.1; interorbital constriction 2; width across nasal swellings 4.4; height of zygomatic plate 2; upper tooththrow to front of canine 5.2.

*Remarks.*—The reference of this species to the genus *Triaenops* is somewhat provisional. *T. tricuspidatus*, heretofore regarded as a *Hipposideros*, may be placed in *Triaenops* with some confidence, but the present species, although obviously departing from typical *Hipposideros* in the same direction, appears not to have progressed so far. The general shape of its skull is not far from that of *Hipposideros*, but in external characters it agrees with *Triaenops* and strongly approaches it in the character of the zygomatic plate and in the secondary cusps of the upper canines. Direct comparison has only been possible with *T. persicus* and *T. tricuspidatus*, since specimens of this genus are very rare in collections. The two small species (*aurita* and *furcula*) described from Madagascar approximate the size of *wheeleri*, but it is not improbable that it will prove less related to these than to *tricuspidatus*.

Among Indo-Chinese bats thus far known, it is easily recognized by its small ears, its tridentate nasal appendage, and its well-marked expansion of the zygoma.

Six skins with skulls and two in alcohol were obtained at Muong Moun, Tonkin, by the Kelley-Roosevelts Expedition. A single skin without skull and forty-six alcoholics were taken in the vicinity of Chapa, Tonkin, by Delacour and Lowe in 1930.

### *Coelops frithii inflata* Miller.

*Coelops inflata* Miller, Proc. Biol. Soc. Wash., 41, p. 85, Mar. 16, 1928—Yenping, Fukien, China.

K.-R.—Muong Moun, T. 4 (2 sk., 1 alc., 1 skull).

D. & L. 1929-30.—Hoi Xuan, A. 1 (alc.).

Bats of the genus *Coelops* are quite rare in collections and nearly all the known specimens have been examined in identifying the present small series. In the British Museum there were accessible two skins from Java representing *bernsteini*; one skin from Cherapunyi, Assam, provisionally regarded as *frithii*; one skull from Lakhun, Laos; and the type of *robinsoni* from Pahang, Malay

Peninsula. Through the kindness of G. S. Miller, Jr., and G. M. Allen, the types of *inflata* and *sinicus* also have been available.

It is difficult to believe that the five names above mentioned represent as many separate and distinct species, but with scarcely more than one specimen for each name, and with each specimen showing some peculiarity, conclusions are difficult. In such cases it is customary to use binomials until material is more abundant in spite of great probability that complete gradation from one form to another will be found and that some of the characters of single specimens will not be maintained in series. The facts are that in *Coelops* the dependable characters shown by the various named forms are of a kind usually found to be subspecific and evidence that any two forms occupy the same territory is lacking. With the possible exception of *sinicus*, which is of different color and much larger than the others, all the names might profitably be brought together as subspecies of *frithii*.

The Indo-Chinese specimens agree fairly well with the type of *inflata*, but do not show quite the same degree of enlargement of the braincase. They may thus be tending toward *robinsoni*, although they still exceed that form quite decidedly. The space between the outer lower incisor and the canine, which Miller has mentioned as a generic distinction, proves to be variable. In *sinicus*, these teeth are actually in contact. In one specimen from Tonkin, the space is slight, scarcely more than the width of one of the dentations of the incisor, while in others from the same locality it is nearly or quite equal to the full width of the incisor.

Javanese specimens of *C. f. bernsteini* seem indistinguishable externally from *frithii* as represented by the specimen from Assam. The skulls also are very similar, that of *frithii* differing mainly in somewhat broader, heavier teeth. The skull from Lakhun, Laos, is a little larger than specimens of *inflata* from Tonkin but agrees with them in having the teeth narrower than in *frithii* and *bernsteini*. Therefore, it is perhaps to be regarded as somewhat connectant.

*C. f. robinsoni* is quite the smallest form yet discovered. Measurements of the skull of its type, which were not published by the original describer, are given in the following series which includes consecutively (1) type of *robinsoni*, (2) type of *inflata*, (3) *bernsteini* from Java, (4) type of *sinicus*. Greatest length 14.5, 15.1, 16.5, 17.1; zygomatic width 6.4, 6.8, 7.3, 7.8; width of braincase 6.7, 7.5, 7.6, 8.1; rostral width 3.4, 3.6, 4.1, 4.2; upper toothrow 4.7, 5.2, 5.7, 6.3. These measurements show a graded progression in size from the

smallest form *robinsoni* to the largest one *sinicus*, and when more specimens become available from intermediate localities, complete inosculation may well be expected.

The genus *Coelops* has numerous dental characters distinguishing it from *Hipposideros*. Among them one which seems not to have been mentioned by previous writers is the existence of an anterior third cusp on the upper canine. In *sinicus* this is not well defined, but in the other forms it is quite prominent, giving the tooth the appearance of a primitive premolariform condition.

### **Taphozous melanopogon** Temminck.

*Taphozous melanopogon* Temminck, Monog. Mamm., 2, p. 237, pl. 60, figs. 8, 9, 1835-41—Java.

K.-R.—Pak Hou, L. 5 (sk.).

Specimens of typical *melanopogon* from Java have not been available for comparison. The length of the forearm in these northern examples is 65-67 which is not unusual in series from India and Burma but is perhaps somewhat longer than will be found in East Indian material.

### **Murina cyclotis** Dobson.

*Murina cyclotis* Dobson, Proc. As. Soc. Beng., p. 210, 1872; Jour. As. Soc. Beng., p. 206, pl. 14, part II, 1873.

K.-R.—Muong Moun, T. 1 (sk.); Phong Saly, L. 3 (sk.).

These agree with Indian specimens from the Chin Hills referred to this species by Wroughton. The type locality is said to be "unknown" and the type in the Indian Museum (No. 166a) appears to have had no recent examination. The species has been recorded from the island of Hainan by J. A. Allen (Bull. Am. Mus. Nat. Hist., 22, p. 487, 1906).

### **Murina tubinaris** Scully.

*Harpiocephalus tubinaris* Scully, Proc. Zool. Soc. Lond., p. 200, 1881—Gilgit, Kashmir.

K.-R.—Muong Boum, T. 1 (sk.); Muong Mo, T. 2 (sk.); Phong Saly, L. 5 (sk.), 1 (alc.).

These appear to be the first records of this species for localities outside of India. Comparison with specimens from Darjeeling shows no important differences.

**Pachyotus kuhli Leach.**

*Scotophilus kuhli* Leach, Trans. Linn. Soc. Lond., 13, p. 71, 1822—no locality.

K.-R. —Phong Tho, T. 1 (sk.); Phouc Mon, Quangtri, A. 8 (sk.), 1 (alc.).

REC. 1925-29.—Backan, T. 3.

These are equal in size to large examples from India and Burma, but do not reach the dimensions recorded for *P. k. insularis* of the island of Hainan. Forearms measure 60.8, 61, 61.5, 63, 63.5, 63.5, 64.3. Most of the specimens are rich Hazel in color both above and below, but several are dull olivaceous above and bright, nearly Yellow Ocher below.

**Pachyotus castaneus Horsfield.**

*Nycticejus castaneus* Horsfield, Cat. Mamm. E. Ind. Mus., p. 38, 1851—Malacca.

K.-R.—Quangtri, Phouc Mon, A. 3 (sk.).

REC. 1925-29.—Quang Ngai, A. 1.

Comparison of these has been made with specimens from Tenasserim and southern Siam from which they do not appear to differ in any important way. Specimens of *Scotophilus gairdneri* Kloss (Jour. Nat. Hist. Soc. Siam, 2, p. 284, 1917) from central Siam have not been available. *Scotophilus castaneus consobrinus* Allen (Bull. Am. Mus. Nat. Hist., 22, p. 485, 1906) from Hainan also seems very closely allied.

**Nyctalus noctula sinensis Peters. CHINESE NOCTULE BAT.**

*Vesperus sinensis* Peters, Monatsb. Akad. Wiss., Berlin, (1880), p. 258, 1881—Peking, Chihli, China.

*Nyctalus noctula sinensis* A. B. Howell, Proc. U. S. Nat. Mus., 75, p. 18, 1929.

K.-R.—Suifu, Szechwan 5 (alc.); Yachow, Szechwan 1 (alc.).

The Asiatic noctule bats closely allied to *N. noctula* of Europe have received several names and material representing them is scattered among various museums. Until these can be brought together for a general study, therefore, the identification of individual specimens is difficult. Apparently most of the eastern forms are smaller and have a greater extension of hair on the membranes, especially the interfemoral, than the European noctule, so this may distinguish them collectively; but characters of color and pro-

portions have not been thoroughly worked out and the status of any particular name is doubtful.

The present specimens are quite dark in color and agree in general with the form called *velutinus* by G. M. Allen (Am. Mus. Novit., No. 85, p. 7, Aug. 28, 1923). The only difference deducible from the description is in the length of the second phalanx of the third finger which is given as 21.5 mm. for *velutinus*, whereas in our specimens it measures only 14 mm. The forearm in five specimens from Szechwan varies from 49.5 to 52. Specimens of *N. n. labiatus* of Nepal have not been available for comparison, so it seems best to follow Howell and refer Szechwan examples to *sinensis*. *Nyctalus n. namayei* Kuroda (Annot. Zool. Japon., 9, part V, p. 601, 1920) appears not to have been compared with *sinensis*, but the published measurements (forearm 45–48) indicate it to be a form of relatively small size.

### **Miniopterus schreibersi parvipes Allen.**

*Miniopterus schreibersi parvipes* Allen, Am. Mus. Novit., No. 85, p. 7, Aug. 28, 1923—Yenping, Fukien, China.

REC. 1925–29.—Ngai Tio, T. 7.

Specimens taken by Herbert Stevens and recorded by Thomas as “one of the dark eastern forms of this widely spread bat” are the only ones contained in any of the collections reviewed. Allen’s name *parvipes* may be provisionally assigned to them although distinction from the Indian *fuliginosus* has not been fully demonstrated. Their relationship to Temminck’s *blepotis* of Java is still to be considered.

### **Kerivoula papillosa Temminck.**

*Vespertilio papillosus* Temminck, Monog. Mamm., 2, p. 220, pl. 55, figs. 1–4, 1835–41—Java.

K.-R.—Muong Mo, T. 1 (sk.).

A bat of the genus *Kerivoula* is provisionally referred to *K. papillosa*. In external measurements (forearm 40.7), it agrees with the form described from Calcutta as *lenis* (Thomas, Jour. Bomb. Nat. Hist. Soc., 24, p. 417, 1916), but the skull and teeth are larger, about as given for typical *papillosa*.

### **Kerivoula depressa Miller.**

*Kerivoula depressa* Miller, Proc. Biol. Soc. Wash., 19, p. 64, 1906—Biapo, northeast of Tounghoo, southern Burma.

K.-R.—Muong Mo, T. 1 (sk.).

A single *Kerivoula*, taken at the same locality with *K. papillosa*, is probably allied to *K. depressa*. It shows a similar broadening of the braincase, but its skull is considerably larger than in the type of *depressa* which has been loaned by the United States National Museum. In external size and appearance it agrees with *depressa* and may be referred to that form, at least provisionally, since its separation would scarcely be justified without examination of a larger number of specimens.

**Kerivoula sp.**

K.-R.—Phong Saly, L. 1 (alc.).

An alcoholic specimen of a plain-colored *Kerivoula* is in rather poor condition and cannot be satisfactorily diagnosed. The forearm is 39, which might indicate affinity to *K. papillosa*, but the lower leg and foot (injured) scarcely reach 24, which is too short for that species.

**Myotis (Leuconoe) longipes Dobson.**

*Vespertilio longipes* Dobson, Proc. As. Soc. Beng., p. 110, 1873—Bhima Devi, Kashmir.

*Vespertilio megalopus* Dobson, Ann. Mag. Nat. Hist., (4), 16, p. 261, 1875—Africa [sic].

*Leuconoe longipes* Thomas, Jour. Bomb. Nat. Hist. Soc., 23, pp. 610, 612, May, 1915.

K.-R.—Muong Moun, T. 1 (sk.).

The skull of this bat has been compared with that of a cotype of *longipes* and that of the actual type of *megalopus* in both of which the skulls are perfect. The three agree so closely that not even the slightest distinction can be drawn among them. Although Thomas states (l.c., p. 610) that the occurrence of *M. daubentoni* in India is "extremely doubtful," I am much inclined to the belief that this bat is more closely related to that species than to any other. It is rare in India and apparently is now represented in the British Museum only by the two specimens above mentioned. Externally it is similar to specimens from the Kurile Islands referred to *daubentoni* and also to *macrodactylus* from Japan. In these the skull is slightly larger, with a somewhat larger braincase. In the Tonkin specimen the color is paler than in the more northern skins, and the pale color of the under parts is extended to the base of the ears and on the side of the neck.



I am unable to see generic significance in the larger feet of the species embraced under the name *Leuconoe*. For the sake of that "convenience" which seems to apply mainly to the arrangement of specimens in museum cabinets a subgeneric term may be desirable.

***Myotis muricola* Gray.**

*Vespertilio muricola* Hodgson, Calc. Jour. Nat. Hist., 2, p. 212, 1841—  
nomen nudum; Gray, Cat. Mamm. & Birds Nepal & Thibet, p. 4, 1846  
—central Nepal.

K.-R.—Phong Saly, L. 6 (sk.).

The name *muricola* may be used in the "blanket" sense for these specimens. Direct comparison with typical *muricola* has not been possible, but descriptions indicate agreement in all except details which are not likely to prove of more than subspecific significance. *M. fimbriatus* (Peters, Proc. Zool. Soc. Lond., p. 617, 1870), which has a forearm of about the same length (38–39) as *muricola*, is a bat of quite different color and has a heavier skull with a high braincase and the anterior premolars are wholly in the toothrow. Specimens from Yenpingfu, Fukien, topotypes of *M. hirsutus* (A. B. Howell, Proc. Biol. Soc. Wash., 39, p. 139, 1926), have been used to represent *fimbriatus*. The probability that *hirsutus* is a synonym of *fimbriatus* has been called to my attention by G. M. Allen.

***Myotis siligorensis alticraniatus* subsp. nov.**

*Type* from Muong Moun, Tonkin. No. 32,174 Field Museum of Natural History. Adult female. Collected March 26, 1929, by R. E. Wheeler. Orig. No. 102.

*Diagnosis*.—Similar to *M. siligorensis*, but with a smaller skull and weaker dentition. Size very small (forearm 33–35, condylo-basal length of skull less than 12). Ears small, narrow, and sharply notched on the outer border; tragus slender, fusiform, nearly uniform in width except at the rather abruptly pointed tip; wing from just proximad of the base of the outer toe; tail slightly longer than the head and body. Skull very small with high, abruptly vaulted cranium; canines short and weak.

*Color*.—Upper parts dark Blackish Brown, the tips of the hairs scarcely lighter than the bases; under parts Buffy Brown superficially, Blackish Brown basally.

*Skull and teeth*.—Skull very small and light; braincase unusually high, its height nearly 80 per cent of its width so that from above

the cranium has almost the appearance of globosity. Teeth similar in general to those of *M. mystacinus*, but weaker, the molars narrower and the canines lower; outer upper incisor separated from canine by a space slightly less than its width; anterior upper premolar with a higher crown than the following one, but the diameter of its shaft only slightly greater; small premolars directly in line in the toothrow, separated from the large premolar by a slight space; upper canines slightly higher than last premolars; lower canines smaller than last premolars and, in spite of their position, with their points standing lower in the toothrow than those of the large premolars; first lower premolar only slightly smaller than canine.

*Measurements.*—Seven adults measured by the collector: total length 71 (65–78); tail 36.7 (34–38); hind foot 7.4 (7–8). Forearms (dry) 34.7 (33–35.4); ear from meatus (dry) 8. Skull of type: greatest length 12; condylo-basal length 11.4; zygomatic width 7; interorbital constriction 2.9; width of braincase 5.7; depth of braincase 4.5; maxillary toothrow 5.3.

*Remarks.*—This bat is characterized by its high, vaulted cranium and its very small size, being apparently the smallest Old World species of *Myotis*. This diminutiveness is evidenced more by the skull than by external measurements, since the length of the forearm equals that of some other forms. It belongs to the group typified by *M. mystacinus* among which Thomas (Jour. Bomb. Nat. Hist. Soc., 23, p. 609, 1915) has recognized two series, one with a lower braincase and longer canines as in typical *mystacinus* and another with high braincase and short, small canines. In the present knowledge of the group, it might be convenient to treat all the named forms as subspecies of *mystacinus* (as doubtless most of them will eventually prove to be), but with two types occupying the same region in India, it seems probable that the one showing the greatest departure from *mystacinus* may be specifically distinct. Therefore the present form is linked with *siligorensis* rather than *mystacinus*.

Except for one example from Dakto, Annam, of which the skull is not available, I have been unable to find any specimens of this supposed new form in the collection of the British Museum, including the large accessions from India recently received through the survey of the Bombay Natural History Society. It seems most closely related to *siligorensis*, of which very few specimens except the type are known. The skull of this type (from Nepal) lacks the basicranial parts, but it is evident that the braincase is of the high form. Its

upper tooththrow measures 5.7 and the teeth, although larger and wider, are in general proportions similar to those of *alticraniatus*.

The names *caliginosus*, *blanfordi*, and *moupinensis* apply to forms with relatively low braincases, and *nipalensis* (Dobson, Proc. As. Soc. Beng., p. 214, 1871; Monog. As. Chiropt., p. 302, 1878) can scarcely fail to be a synonym either of *caliginosus* or of *siligorensis*. The form from Fukien called *sowerbyi* (A. B. Howell, Proc. Biol. Soc. Wash., 39, p. 138, 1926), as shown by a series loaned by the United States National Museum, is closely allied to *siligorensis* and differs from *alticraniatus* precisely as does the type of *siligorensis*, namely, in decidedly larger size. If better material should prove *sowerbyi* separable from *siligorensis*, it would still be necessary to consider *laniger* (Peters, Proc. Zool. Soc. Lond., p. 617, 1870) which comes from a near-by locality (Amoy, China) and which is described as having the same general dimensions.

*Specimens examined*.—Total number 7 (skins) all from the type locality.

### **Pipistrellus abramus** Temminck.

*Vespertilio abramus* Temminck, Monog. Mamm., 2, p. 232, pl. 58, figs. 1, 2, 1841—Nagasaki, Japan.

K.-R.—Quangtri, Phouc Mon, A. 12 (sk.), 4 (alc.).

REC. 1925–29.—Huê, A. 2.

Identical with specimens in the British Museum referred by Thomas to *abramus*. Twelve carefully prepared skins show scarcely any variation in color, all being uniformly light brown.

### **Pipistrellus mimus** Wroughton.

*Pipistrellus mimus* Wroughton, Jour. Bomb. Nat. Hist. Soc., 12, p. 722, pl., figs. 3, 3a, 1899—Mheskatri, Surat Dangs, India.

K.-R.—Quangtri, Phouc Mon, A. 1 (sk.).

The single skin is indistinguishable in color from specimens of *abramus* from the same locality, but the short forearm (28.2) and small short skull are distinctive and exactly as in numerous specimens from India representing *mimus*.

### **Pipistrellus coromandrus tramatus** Thomas.

*Pipistrellus coromandrus tramatus* Thomas, Proc. Zool. Soc. Lond., p. 144, 1928—Backan, Tonkin.

K.-R.—Quangtri, Phouc Mon, A. 2 (sk.); Luang Prabang, L. 1 (sk.); Ngai Cho, T. 1 (sk.); Phong Saly, L. 1 (sk.).

DEL. 1931-32.—Thateng, L. 1.

REC. 1925-29.—Backan, T. 10; Phuqui, A. 3; Thai Nien, T. 17.

Three of the specimens in the collection are very sooty in color, a variation commonly found in these small bats. They were compared with the type of *tratus* and found to be in substantial agreement with it, but until a thorough study of the smaller oriental Vespertilionidae is made, much confidence cannot be placed in identifications of individual specimens.

### **Pipistrellus tralatitius** Horsfield.

*Vespertilio tralatitius* Horsfield, Zool. Res. in Java, unpagcd, 1824—Java.

REC. 1925-29.—Tam Dao, T. 3.

Not represented in the collections of the Kelley-Roosevelts Expedition.

### **Pipistrellus raptor** Thomas.

*Pipistrellus raptor* Thomas, Ann. Mag. Nat. Hist., (7), 13, p. 387, 1904—Tonkin.

Not represented in recent collections and apparently still known only from the original series of six specimens from "Tonkin."

### **Tylonycteris pachypus fulvida** Blyth.

*Scotophilus fulvidus* Blyth, Jour. As. Soc. Beng., 28, p. 293, 1859—Schwegyin, Burma.

*Tylonycteris rubidus* Thomas, Ann. Mag. Nat. Hist., (8), 15, p. 227, Feb., 1915—lapsus for *T. fulvida*.

*Tylonycteris fulvida* Wroughton, Jour. Bomb. Nat. Hist. Soc., 25, pp. 586-587, 1918.

K.-R.—Muong Mo, T. 5 (sk.), 1 (alc.); Muong Mo, T. 1 (sk.); Phong Saly, L. 9 (sk.), 5 (alc.).

REC. 1925-29.—Bao Ha, T. 1; Dakto, A. 2; Ngai Tio, T. 1.

Thomas (l.c.) has called attention to marked differences in size in *Tylonycteris* from India and the East Indies, but after drawing specific distinctions he later decided the variation too confusing to maintain them (Wroughton, l.c., p. 586). Similar differences appear in the material from Indo-China and seem to bear out the original conclusion of Thomas. The series available is an unusually good one consisting of thirty-five carefully made skins with perfect skulls and measurements taken by the collector. Two forms are clearly distinguishable among them, one smaller and more rufescent

and the other larger and duller-colored. Differences in the size of the skulls seem to be definitely correlated with length of forearm and with color. At one locality (Phong Saly) both forms occur together without any evidences of intergradation. The smaller, brighter form agrees closely with specimens from India and Burma representing *fulvida*. Its forearm measures 24.7-26 and its skull has a length of about 11 and a zygomatic width of about 8. Collectors' measurements of nine specimens from Phong Saly are: total length 67 (65-70); tail 29.5 (27.5-31); foot 6.1 (5.5-7). The color is nearly uniform above and below, and ranges from Ochraceous Tawny to Cinnamon Brown, the former color prevailing on the basal part of the hairs and the latter on the terminal.

### ***Tylonycteris robustula* Thomas.**

*Tylonycteris robustula* Thomas, Ann. Mag. Nat. Hist., (8), 15, p. 227, Feb., 1915—upper Sarawak, Borneo.

K.-R.—Phong Saly, L. 8 (sk.), 5 (alc.); Quangtri, Phouc Mon, A. 12 (sk.), 5 (alc.).

The two small series above listed do not precisely agree, but they fall together much better than with *fulvida*. Those from Phong Saly are larger and slightly darker. Their forearms measure 26.5-29 and their skulls have a length of about 12.5 and a zygomatic width of about 9.3. Since these approximate the measurements given for *T. robustula*, that name is used for them. The color is deep Mummy Brown somewhat lighter below and the general effect is that of sootiness as compared to *T. fulvida*.

The specimens from Quangtri seem to be somewhat like those referred to by Thomas as "middle," being intermediate in size between the two extremes. They are nearer to the larger form, especially in color, and may perhaps represent a slight differentiation of it without any real, close affinity to *fulvida*.

### ***Discopus denticulus* gen. et sp. nov.**

*Type* from Phong Saly, Laos. Altitude 4,400 feet. No. 32,195 Field Museum of Natural History. Female adult. Collected May 3, 1929, by Russell W. Hendee. Orig. No. 5,522.

*Diagnosis*.—Externally similar to *Pipistrellus*, but tragus longer and more slender although not pointed at the apex; ears longer and narrowed at the tip; hind feet with highly developed disklike pads even more extreme than in *Tylonycteris* and *Glischropus*. Skull

with a broad, greatly flattened braincase, somewhat as in *Tylonycteris* but with a longer, narrower rostrum; dentition with two upper and three lower premolars on each side, the middle lower pair small and internal to the toothrow.

*Color*.—Upper parts Cinnamon Brown, the hairs unicolored from base to tip; under parts brighter-colored, nearly Amber Brown, the hairs with darker bases.

*Skull*.—Braincase depressed or flattened to nearly the same extent as in *Tylonycteris*; rostrum decidedly longer than in *Tylonycteris* or *Pipistrellus* and somewhat upturned anteriorly, with a pronounced depression in the interorbital region; zygomata widely expanded; antorbital processes not developed; palate relatively long; basioccipital wide; coronoid process of mandible high and blunt, its posterior border slightly concave; dentition with two upper and three lower premolars; I.  $\frac{1}{2}$ ; C.  $\frac{1}{2}$ ; Pm.  $\frac{3}{4}$ ; M.  $\frac{3}{4}$  = 34; general form of teeth not peculiar, but in the molariform series the teeth are wider in proportion to length than in *Pipistrellus*, *Glischropus* and *Tylonycteris*; inner upper incisor bifid; outer upper incisor normal in position, nearly or quite equal in size and height to the inner one and separated from the canine by a slight space; anterior upper premolar in contact with canine, but slightly separated from posterior premolar; middle lower premolar minute, rounded and slightly internal to toothrow.

*Measurements*.—Four adults measured by the collector: total length 83 (81–86); tail 40 (39–42); hind foot 6. Adult in alcohol: forearm 37.8; second finger, metacarpal 31.7; third finger, metacarpal 34.2; first phalanx 16.2; second phalanx 14.8; fourth finger, metacarpal 32.6; first phalanx 9.8; second phalanx 8.5; fifth finger, metacarpal 32.2; first phalanx 9; second phalanx 7.5; tibia 17.2; hind foot 6.2. Skull of type: greatest length 14.2; condyle to front of canine 13.2; palatal length 6.5; front of orbit to end of premaxilla 4.7; zygomatic width 9.7; mastoid width 7.9; interorbital constriction 3.6; depth of braincase 3.9; width outside molars 5.8; front of canine to back of molars 5.4; lower toothrow to front of canine 5.8.

*Remarks*.—This bat combines to some extent certain characters of *Pipistrellus*, *Glischropus*, and *Tylonycteris*. It differs from all of them in the possession of three pairs of lower premolars. From *Pipistrellus* and *Glischropus* it is further distinguished by its greatly flattened braincase which suggests that of *Tylonycteris*, but since this last genus has only one upper premolar, it is well distinguished. The

adhesive disk on the foot is even larger than in *Glischropus* and *Tylonycteris*. In alcoholic specimens it is subrectangular in shape, yellowish in color, and it measures about 4.7 by 3.3.

The middle pair of lower premolars is uniformly present in the six specimens examined, so there seems no reason to question its being a normal condition. The species was taken only at Phong Saly, Laos.

**Galeopterus variegatus** subsp. FLYING LEMUR.

REC. 1925-29.—Tay Ninh, C.C. 1.

Thomas (1929, p. 833) has recorded one specimen under the name *pumilus*, the applicability of which seems doubtful. It constitutes the easternmost continental record of the genus.

**Hylomys suillus microtinus** Thomas.

*Hylomys suillus microtinus* Thomas, Proc. Zool. Soc. Lond., p. 497, 1925—Thai Nien, Tonkin.

K.-R.—Phong Saly, L. 1.

REC. 1925-29.—Bao Ha, T. 1; Thai Nien, T. 1.

A specimen from Phong Saly collected by Hendee brings the known examples of this form to a total of three. It agrees essentially with the type which seems well distinguished from *peguensis* and *siamensis* by its darker and more uniform color.

**Hylomys suillus siamensis** Kloss.

*Hylomys siamensis* Kloss, Jour. Nat. Hist. Soc. Siam, 2, p. 10, 1916—Hinlap, between Saraburi and Korat, south-central Siam.

REC. 1925-29.—Dakto, A. 12; Xieng Kuang, L. 1.

Following Thomas, these specimens may be referred to *siamensis*, but material not available to Kloss seems to indicate that *siamensis* is more closely similar to *peguensis* than has been supposed. Specimens in Field Museum from the Namting River at the Burma-Yunnan border, referred by G. M. Allen to *peguensis*, do not differ in color from the type of *siamensis*. Whether these really represent *peguensis*, however, cannot be determined with certainty until specimens are obtained from Lower Burma in the region of the type locality (Schwegyin, Lower Burma). Kloss mentions the narrower nasals of *siamensis* as compared with *suillus* and this character is shown by the Annamese specimens when compared with the supposed

*peguensis* from Upper Burma. Further locality records are Sikortur (northwest of Raheng), Me Taw, and Pakchan, Siam (Kloss, Jour. Nat. Hist. Soc. Siam, Suppl., 8, p. 77, 1930).

*Neotetracus sinensis fulvescens* subsp. nov.

*Type* from Chapa, Tonkin. No. 32.4.19.3. British Museum. Adult female. Collected Dec. 2, 1930, by J. Delacour and W. Lowe. Orig. No. 1,520.

*Diagnosis.*—Similar to *N. sinensis* of western China, but under parts usually more heavily suffused with fulvous; skull larger; dentition heavier.

*Color.*—Upper parts much as in *N. sinensis*, but averaging more ochraceous in tone, the prevailing color inclining to Cinnamon Brown rather than Dresden Brown; under parts usually with a heavy wash of Ochraceous Tawny either covering the entire under surface or most of the chest and belly, less developed in young animals and often very intense in old ones; feet whitish with a dark line down the outer side to the base of the toes; tail sharply bicolor, dusky above, narrowly white below.

*Skull.*—Larger and heavier than in *sinensis*, the greatest length reaching to 37.7; dentition heavier.

*Measurements.*—Average of ten adults: total length 198 (185–229); head and body 129 (121–148); tail 68 (63–82); hind foot 24.4 (23–26). Skull of type: greatest length 33.4; zygomatic width 17.8; width between postorbital processes 8.6; median length of nasals 11.4; width of braincase 14.1; upper tooththrow from front of canine 16.7; molariform tooththrow 7.2.

*Remarks.*—The insectivorous genus *Neotetracus*, previously known only from western China, is represented by a large series from Chapa, Tonkin. There are thirty-seven specimens of which eight are in alcohol. As compared with a series of ten from Yunnan in Field Museum, representing *sinensis*, these are conspicuously more fulvous below, but the Yunnan specimens are mostly subadult and there seems to be a tendency for the older individuals to be the most fulvous. Further comparison with aged examples of *sinensis*, therefore, would be desirable. Skulls of comparable ages show a definite increase in general size and in that of the dentition in the Indo-Chinese form.



***Tupaia belangeri chinensis* Anderson. CHINESE TREE SHREW.**

*Tupaia chinensis* Anderson, Zool. Res. West Yunnan, p. 129, pl. 7, figs. 8, 9, 1879—Ponsee, Kakhien Hills, near Burma border, Yunnan, China.

K.-R.—Likiang, Yunnan 1; Nguluko, Yunnan 6.

These localities doubtless are near the northern limit of tree shrews, since Stevens obtained no further specimens after leaving the Likiang region. The specimens were taken in February and are in full winter pelage in which the body color encroaches extensively on the sides of the belly. The summer pelage is shown by three specimens in Field Museum taken at Yunnan Yi early in September just before the transition to the winter coat. Two of these have the under parts wholly light-colored and the third is in process of change. Except for their much paler under parts, therefore, they are much like *modesta* in the same pelage.

***Tupaia belangeri modesta* J. A. Allen. HAINAN TREE SHREW.**

*Tupaia modesta* J. A. Allen, Bull. Am. Mus. Nat. Hist., 22, p. 481, 1906—Lei Mui Mon, island of Hainan.

*Tupaia belangeri yunalis* Thomas, Ann. Mag. Nat. Hist., (8), 13, p. 244, 1914—Mongtze, Yunnan.

*Tupaia belangeri tonquinia* Thomas, Proc. Zool. Soc. Lond., p. 497, 1925—Bao Ha, Tonkin.

K.-R.—Bactan Trai, T. 1; Chapa, T. 1; Lieng San, T. 2; Muong Boum, T. 1; Muong Yo, L. 1; Nam He, T. 1; Pa Ham, T. 1; Phong Saly, L. 6; Phong Tho, T. 1.

D. & L. 1929-30.—Chapa, T. 10; Hoi Xuan, A. 8; Lung Lunh, A. 1; Pakha, T. 1.

DEL. 1931-32.—Thateng, L. 12.

REC. 1925-29.—Backan, T. 6; Bao Ha, T. 2; Chora, T. 1; Col des Nuages, A. 4; Dakto, A. 1; Kontoum, A. 1; Muong Sen, A. 3; Napé, L. 4; Ngai Tio, T. 3; Phuqui, A. 3; Thai Nien, T. 1; Thua Lua, A. 2; Xieng Kuang, L. 18.

In all the large series of tree shrews from Indo-China accumulated through the various expeditions since 1924, by far the greater number are in full winter pelage. In this pelage the hairs of the under parts usually have dark bases throughout and the body color is extended over the sides of the belly, leaving only a narrow midventral line of lighter color continuous with expanded areas of the same on the chest, throat and ungual region. As indicated mainly by specimens showing its beginning or ending, the summer pelage is quite different, the under parts being light-colored throughout, the hairs mostly

self-colored, and the under parts as a whole well distinguished from the upper parts. In the few specimens in full summer pelage, the line of demarcation is sharply marked.

Seven specimens in the Kelley-Roosevelts collection from Phong Saly and Muong Yo, Laos, are very illuminating. They were taken on or about May 1 and are in various stages of transition from one pelage to the other. Only one of the adults retains traces of the winter color of the under parts although both pelages of the upper parts are plainly evident in all. With them are two young examples in a full, fresh pelage closely resembling the usual winter pelage and in very great contrast to the adults from the same locality in which the summer pelage is being acquired. In one specimen from Chapa, Tonkin, taken October 30, transition from summer to winter is shown. New pelage covers the anterior half of the under parts and the hairs are with dark bases, but the posterior half has the light, self-colored hairs of the summer pelage and is thus practically indistinguishable so far as this area is concerned from the spring specimens from Phong Saly.

After examination of more than ninety specimens, I am unable, on the basis of the winter pelage, to draw any constant distinctions between the tree shrews of the island of Hainan and those of the mainland or between those of highlands and lowlands from north-western Tonkin and northern Laos to central Annam. So far as it is represented, the summer pelage also furnishes no grounds for division. There is some variation in depth of color, but this cannot be correlated with locality. Extremes of olivaceous and reddish brown occurring indiscriminately seem to point to a slight dichromatism. A fairly common variation is in the coloration of the chin and throat where, even in winter, the hairs may be light-colored to their roots, although usually with dark bases.

Topotypes of *modesta* from Hainan, loaned by the American Museum of Natural History, can be matched in every detail by specimens from the mainland and, although larger series especially from Hainan would be desirable, it seems quite impossible with present material to mention any differentiating character. In 1925, when Thomas proposed the name *tonquinia*, he had only a half dozen mainland specimens and still fewer from Hainan. The supposed difference in the amount of black in the tail does not hold when series are examined.

The type of *T. b. yunalis* was taken in July and this doubtless accounts for its light under parts. Moreover, the type locality

(Mongtze, Yunnan) is not far from that of *tonquinia* and in a region in which the fauna is known to be preponderantly the same as that of northeastern Tonkin. Therefore, the distinction of *yunalis* cannot be maintained, at least not until both pelages are better represented in collections than at present. *T. b. laotum* (Thomas, Ann. Mag. Nat. Hist., (8), 13, p. 244, 1914) from Nan, northern Siam, has not been examined, but in view of the wide distribution of *modesta* and the supposed intergradation with *concolor*, the slight characters assigned to it may need confirmation.

### ***Tupaia belangeri concolor* Bonhote.**

*Tupaia concolor* Bonhote, Abstr. Proc. Zool. Soc. Lond., p. 2, Jan. 22, 1907;  
Proc. Zool. Soc. Lond., p. 7, June, 1907—Nhatrang, Annam.

REC. 1925-29.—Bokor, C. 2; Sambor, C. 1; Siem Reap, C. 3;  
Tay Ninh, C.C. 2.

Although supposed to have only two pairs of mammae instead of the three usual in the *belangeri* series, this form is regarded by Kloss and Thomas as only subspecifically separable. A specimen in Field Museum from Bangkok, Siam, plainly has but two pairs of mammae. A further complication is *T. glis cambodiana* Kloss (Jour. Nat. Hist. Soc. Siam, 3, p. 357, 1919) which is stated to have six mammae and to inhabit the same region as *concolor*.

### ***Dendrogale frenata* Gray. PIGMY TREE SHREW.**

*Tupaia frenata* Gray, Ann. Mag. Nat. Hist., (3), 6, p. 217, 1860—Cambodia.

D. & L. 1929-30.—Ninh Hoa, Nhatrang, A. 1.

REC. 1925-29.—An Binh, C.C. 4.

These are among the very few examples of the species thus far recorded.

### ***Talpa klossi* Thomas. SIAMESE MOLE.**

*Talpa klossi* Thomas, Ann. Mag. Nat. Hist., (10), 3, p. 206, Feb., 1929—  
Hue Nya Pla, 10 miles n.w. of Raheng, Siam.

D. & L. 1929-30.—Chapa, T. 6.

DEL. 1931-32.—Thateng, L. 2.

The discovery of moles in Tonkin increases the probability of connection with the forms of northern India. The specimens are in complete agreement with the description of *T. klossi*, the skulls being decidedly smaller and narrower than in *T. micrura* of which

a series is now available in Field Museum, obtained by the Cutting Sikkim Expedition. The external and cranial resemblance of *klossi* to *P. leucurus* is evidently so close that suspicion seems justified as to the normality of the numerical difference in dentition.

**Parascaptor leucurus** Blyth. WHITE-TAILED MOLE.

*Talpa leucura* Blyth, Jour. As. Soc. Beng., 19, p. 215, pl. 4, figs. 1, 1a, 1850—Cherrapunji, Assam.

REC. 1925-29.—Xieng Kuang, L. 1.

This specimen has not been examined, but the record by Thomas is accepted although his failure to make any reference to it when describing *Talpa klossi* seems rather unaccountable.

**Chimarrogale himalayica** Gray. HIMALAYAN WATER SHREW.

*Crossopus himalayicus* Gray, Ann. Mag. Nat. Hist., (1), 10, p. 261, 1842—"Himalayas," India.

K.-R.—Phong Saly, L. 1.

D. & L. 1929-30.—Chapa, T. 2.

Water shrews from Tonkin and Laos appear referable to the Himalayan form and do not especially approach the one recorded from Annam or that from Fukien. They differ from typical *himalayica* in somewhat paler, less brownish under parts, but the material is so limited that it seems inadvisable to add any further names. Collector's measurements of an adult male are: total length 213; tail 84; hind foot 26.

The type of *himalayica* in the British Museum is a "dismounted," stuffed skin somewhat altered by exposure to light and its skull is represented only by tiny fragments to which are attached the upper incisors, five of the upper unicuspid, one lower incisor, and one lower unicuspid. There are three additional specimens from Sikkim including one skull without braincase but with the antecranial part and all the teeth intact. The teeth of Indo-Chinese specimens agree in size with those of the type and the other specimen examined from Sikkim. In size of teeth *himalayica* stands well differentiated from the other continental members of the group and perhaps does not intergrade with them. The others, however, differ among themselves mainly in the size of the teeth, *styani* (Szechwan) being smallest, *leander* (Fukien) slightly larger, and *varennei* (Annam) a little larger still; but none of them equals *himalayica*. It is not

improbable, therefore, that gradation from one to the other will eventually be found.

External characters are difficult to evaluate with only one or two specimens of each form available. In *styan* (two specimens only) the under parts are very light-colored and this silvery extends to the upper lips and sides of the face; in *leander* (type only) the entire under parts are so worn that they appear scarcely lighter than the upper parts, but the white on the under side of the tail is marked although extending for only two-thirds its length; in *varenner* (type only) the tail is wholly dark and thus unique among continental forms.

The group to which these water shrews belong is a very compact one. The species of Borneo (*phaeura*) and Sumatra (*sumatrana*) have been placed separately in a genus *Crossogale* (Thomas, Ann. Mag. Nat. Hist., (9), 7, p. 243, March, 1921), although it is obvious that they are very closely allied to the continental ones belonging to true *Chimarrogale*. This close relationship, which may be of much zoogeographic importance, was recognized when both continental and insular species were included in *Chimarrogale*. Dividing them into two genera obscures the relationship and unless the distinctions between them should be very pronounced, would seem to be a disadvantage rather than otherwise. These distinctions are relative, not absolute, and consist only in the development in *Crossogale* of an inner cusp on the upper incisors making them imperfectly bifid. This cusp is found in an incipient condition in *Chimarrogale* and, if a large number of specimens were available, it is not unlikely that occasional ones would show more of it. It is the normal condition in *Soriculus*.

There are then two significant facts about this group: (1) the obvious relationship of the continental and insular species; and (2) the pronounced development of a supplementary inner cusp in the upper incisors of the two island species. One of these facts is emphasized by using only one generic name and the other by using two generic names. If *Crossogale* were given only subgeneric rank, however, the nomenclature and both facts would be in complete conformity. It seems to be a particularly good illustration of the undesirable results obtained by overemphasis of the generic category of classification.

### ***Crocidura dracula* Thomas.**

*Crocidura dracula* Thomas, Ann. Mag. Nat. Hist., (9), 9, p. 686, June, 1912  
—near Mongtze, Yunnan.

*Crociodura praedax* Thomas, Ann. Mag. Nat. Hist., (9), 11, p. 656, June, 1923—Likiang valley, Yunnan.

K.-R.—Ba Nam, T. 1; Chapa, T. 1; Lai Chau, T. 2; Muong Chao Noi, near Phong Saly, L. 1; Muong Mo, T. 1; Nguluko, Yunnan 2. D. & L. 1929-30.—Chapa, T. 40 (35 sk., 5 alc.); Hoi Xuan, A. 1. REC. 1925-29.—Ngai Tio, T. 3.

Although not taken in numbers by the Kelley-Roosevelts Expedition, the very large series obtained by Delacour and Lowe at Chapa seems to indicate that this is the most common shrew of the elevated parts of Tonkin. It is also well represented in Field Museum by numerous specimens from the Likiang region of Yunnan, type locality of *C. praedax*.

Examination of the types of both *dracula* and *praedax* in the British Museum shows only differences which are quite bridged over in the series. The slight color differences noted by Thomas prove to be entirely seasonal and any attempt to substantiate a northern form on the basis of larger size is negated by the occurrence of numerous large specimens in the more southern localities. The largest of all examined are three from the Namting River at the Burma border. The single specimen from Hoi Xuan, which is still farther removed from Likiang, is distinctly larger than the type of *praedax*. A decidedly immature specimen from Laos is very much darker than any of the adults. It seems necessary, therefore, to regard *dracula* and *praedax* as the same and to conclude that minor size variations, as in several others of the smaller insectivores of the region, do not in this case have classificatory significance.

The supposed relationship of *C. griseescens* Howell to *C. dracula* appears to need substantiation by further specimens. A topotype, loaned by the United States National Museum, has a shorter tail than in *dracula*, and the imperfect skull is smaller with a shorter toothrow. In fact, the skull and teeth show very close agreement with some of the larger examples of *attenuata* from Szechwan. The hind foot is rather large, but the specimen has the appearance of having been remade, perhaps from alcohol, so measurements taken from it are probably untrustworthy.

### ***Crociodura attenuata* Milne-Edwards.**

*Crociodura attenuata* Milne-Edwards, Nouv. Arch. Mus. Hist. Nat., Paris, 7, p. 92, 1872; Rech. Mamm., p. 263, pls. 38b, 39a, 1868-74—Mouping, Szechwan.

K.-R.—Yachowfu, Szechwan 1.

This common Chinese shrew is represented by one specimen taken by Jack Young, interpreter for Theodore and Kermit Roosevelt.

***Crocidura vorax* G. M. Allen.**

*Crocidura vorax* G. M. Allen, Am. Mus. Novit., No. 100, p. 8, Dec., 1923 — Snow Mountain, near Likiang, Yunnan.

K.-R.—Nien Yuenfu, Szechwan 1.

This specimen, taken in April, is considerably paler than one from Likiang, taken in November, but otherwise is closely similar.

***Crocidura indochinensis* Robinson & Kloss.**

*Crocidura indochinensis* Robinson & Kloss, Ann. Mag. Nat. Hist., (9), 9, p. 88, Jan., 1922—Dalat, Langbian Plateau, Annam.

D. & L. 1929-30.—Chapa, T. 2 (alc.).

Two small shrews in alcohol appear to represent this species, with the description of which they agree in dimensions and cranial characters. They are rather smaller than *C. vorax*, but their upper unicuspid has similar proportions and, therefore, as suggested by G. M. Allen, they may be allied to that species. The upper toothrow in one specimen measures 7.3; width of palate including molars 5.2.

***Suncus caeruleus* Kerr. MUSK SHREW.**

*Sorex caeruleus* Kerr, Anim. King., p. 207, 1792—India.

K.-R.—Phouc Mon, Quangtri, A. 14.

No attempt has been made to determine these other than as members of the *caeruleus* series, formerly known under the name *murina* and more recently as *myosurus*. The Indian forms have been studied recently (Lindsay, Jour. Bomb. Nat. Hist. Soc., 33, pp. 326-340, Feb., 1929), but the identification of outlying specimens is still difficult owing, as Mrs. Lindsay states, to the unnatural dispersal of the animals which has taken place through railways and steamships. A large adult from the present series measures: total length 230; tail 81; hind foot 22.5.

***Blarinella wardi* Thomas. WARD'S SHORT-TAILED SHREW.**

*Blarinella wardi* Thomas, Ann. Mag. Nat. Hist., (8), 15, p. 336, 1915—Hpimaw, Upper Burma.

K.-R.—Nguluko, near Likiang, Yunnan 1.

A single specimen of the rare genus *Blarinella* may be referred to this species. The skull, which is imperfect anteriorly, has a braincase with a width of 8.5 mm., exactly the dimension given for the type of *wardi*. The breadth between the outer edges of the glenoid processes is 5.2 mm.

### **Anourosorex squamipes** Milne-Edwards.

*Anourosorex squamipes* Milne-Edwards, Comptes Rendus, Acad. Sci. Paris, 70, p. 341, 1870—Mouping, Szechwan, China.

*Anourosorex squamipes capnias* G. M. Allen, Am. Mus. Novit., No. 100, p. 10, Dec 28, 1923—To-mu-lang, Chung Tien, Yunnan, China.

*Anourosorex assamensis capito* G. M. Allen, supra cit., p. 11—Mucheng, Salween drainage, Yunnan, China.

K.-R.—Chapa, T. 7.

D. & L. 1929-30.—Chapa, T. 30 (4 alc.).

The series of more than thirty specimens from a single locality in Tonkin shows a range of variation in size and color completely covering the supposed distinctions between several named forms. After studying this series and all the specimens in the British Museum (about sixty in number) representing various localities from northern Szechwan to Assam, together with topotypes and material from the original series of the two forms described by Allen, I can find no logical basis for division of the group beyond the recognition of *squamipes* as a wide-ranging, variable species with one local differentiation (*assamensis*) confined to certain parts of Assam.

Available material from Szechwan representing typical *squamipes* does not show such variation in size as that from more southern localities, but the preponderance of the southern specimens is practically indistinguishable. The extremes of size shown in various of the southern series are very puzzling, but they do not seem to have any geographic or altitudinal basis, since they occur indiscriminately in Yunnan, Assam, Burma and Tonkin. Color and dental characters also fail when large series are examined. The "greenish" color of the under parts supposed to characterize *capito* occasionally appears in Szechwan specimens and in the Tonkin series there is evidence that it may be largely, if not wholly, seasonal. This series includes material taken by two different parties at different dates. Specimens obtained by Delacour and Lowe in early December are mostly in a "bluish" plumbeous coat showing evidence of wear and obviously being a summer or autumn pelage about to be renewed. Several specimens show the renewal beginning and have



patches of the "greenish" appearing on the under parts. These specimens, therefore, are carrying parts of two pelages, one bluish and the other greenish. Specimens from the same locality taken two months later by the Kelley Roosevelt Expedition in February are in a fresh new pelage in which the hair is soft and long and the under parts mostly greenish or brownish.

The notch in the second upper incisor is usually found in young unworn teeth, while in the old worn ones it has disappeared, but it is not always well marked in young examples and in almost every series examined there are specimens that show it and others that do not.

The only evidence of pronounced and constant distinction from *squamipes* is shown by two series from the Jaintia Hills and the Mishmi Hills, Assam. These are constantly larger and have coarser pelage than *squamipes* even when this is regarded in a broad sense to include the larger specimens found recurrently in Yunnan, Burma, and Tonkin. It is probable, therefore, that the large head ascribed to *assamensis* by Anderson was that of a specimen of this kind and it may be possible to recognize *assamensis* as a local race of *squamipes*. That it is quite local is shown by a single specimen from the Garo Hills, eastern Assam, which is smaller and not appreciably different from typical *squamipes*.

Measurements of a skull of average size from Shangpung, Jaintia Hills, and of a somewhat larger one from Mishmi Hills are as follows: superior margin of foramen magnum to tip of premaxillae<sup>1</sup> 25.1, 26; greatest length including incisors 26.4, 27.3; palatal length 11.9, 12.2; mastoid width 14.2, 14.9; upper toothrow 12.2, 12.5.

In 1916 Wroughton (Jour. Bomb. Nat. Hist. Soc., 24, p. 766) referred specimens from the Chin Hills, Burma, to *A. squamipes*, quoting O. Thomas as follows: "After very careful examination, I fail to find any character by which this animal can be distinguished from the *A. squamipes* of Szechwan." At that time the large specimens from Assam, referred to above, had not been received and later when they were listed by Hinton and Lindsay (Jour. Bomb. Nat. Hist. Soc., 31, p. 391, Aug., 1926), the name *squamipes* was applied to them without comment, this doubtless being due to the previously expressed conclusions of Wroughton and Thomas. Meanwhile, without access to any of this material, but with appreciation of the large size of *assamensis* as originally described, G. M. Allen (supra cit.) found what appeared to be a larger and a smaller form

<sup>1</sup>This measurement for his type is given by Anderson as 1.04 inches.

at different altitudes in Yunnan and he naturally regarded one as being related to *squamipes* and the other to *assamensis*. This interpretation is perhaps still possible, but a review of practically all existing specimens does not give it confirmation and, unless careful field studies not yet made should demonstrate some logical segregation of the larger and the smaller *Anourosorex* throughout its range, the recognition of several forms cannot be justified. In order to recognize *squamipes*, *capito*, and *capnias*, it would almost be necessary to assume that all three occur at one locality in Tonkin.

In the large series of this genus in the British Museum, the prominence of the elongated hairs of the rump is very striking. This does not seem to be correlated with sex but probably is connected with some glandular development. In 90 per cent of the specimens, these hairs are much elongated, forming an elevated tuft, almost a brush, on the rump. The hairs in most cases are paler than on other parts, rusty brownish or even whitish. Usually they are glistening with a mucilaginous exudation, or frequently matted together with it. The simulation of caked soil or other inorganic matter suggests that there is some connection with the burrowing habit, but examination of the hairs under a hand lens usually shows nothing on them except the above-mentioned exudate. This has been referred to casually by Anderson and Allen, but it appears to deserve emphasis, evidently being a unique character which would well repay study in the field with living animals and which should be examined by dissection of fresh specimens.

### **Chodsigoa lowei** sp. nov.

*Type* from Chapa, Tonkin. No. 32.4.19.4. British Museum. Adult male. Collected Nov. 23, 1929, by J. Delacour and W. Lowe. Orig. No. 1,298.

*Diagnosis*.—Size medium; tail considerably longer than head and body; skull with a high, narrow braincase very different from the broad, flattened type usual in the genus.

*Color*.—Entire body Dark Mouse Gray slightly tinged with brownish on the chest and throat; sparse hairs on feet wholly dusky; tail dusky above, very slightly lighter below in proximal fourth; tip (3 mm.) of tail white; whiskers mainly white or dusky with white tips.

*Skull*.—General shape long and slender; braincase high, narrow, and smoothly rounded without trace of a sagittal ridge; projection

of glenoid fossa reduced and but slightly evident from above; teeth somewhat narrower than in *C. hypsibia* although the length of the toothrow may be slightly greater; molars without pigmentation.

*Measurements.*—Collectors' measurements of type: total length 163; head and body 77; tail 86; hind foot 15. Skull of type: greatest length 20.4; condylo-basal length 19.2; interorbital constriction 5; width of braincase 9.3; height of braincase 5.3; length of palate 7.8; width of palate with molars 5.7; postpalatilar length 9.1; upper toothrow 8.8; lower toothrow 8.2.

*Remarks.*—Although the collection contains but one specimen of this species, its characters are very marked and it cannot be referred to any named form. The shape of the braincase shows none of the flattening seen in *C. hypsibia* and *C. smithi*. In fact it goes almost to the opposite extreme in which the sides of the braincase are approaching the vertical. There is no trace of a sagittal crest and the cranial outlines are essentially as in typical *Soriculus*. To this extent, therefore, it breaks down the distinctions between *Chodsigoa* and *Soriculus*, leaving only the presence or absence of the minute premolar and the pigmentation of the molars to separate them.

This is the first and only record of *Chodsigoa* south of China. The species is named for Willoughby Lowe.

### **Chodsigoa smithi** Thomas.

*Chodsigoa smithi* Thomas, Abstr. Proc. Zool. Soc. Lond., p. 4, 1911—Tatsienlu, Szechwan.

K.-R.—Yulongkong, Szechwan 1.

Collector's measurements are: total length 171; tail 75; hind foot 16. Greatest length of skull 23.5; width of braincase 10.9; upper toothrow 10.3.

### **Soriculus leucops** Horsfield. INDIAN LONG-TAILED SHREW.

*Sorex leucops* "Hodgson," Horsfield, Ann. Mag. Nat. Hist., (2), 16, p. 111, 1855—Nepal.

*Sorex macrurus* Hodgson, Cat. Mamm. Nepal & Thibet, ed. 2, p. 9, 1863—nomen nudum.

*Soriculus macrurus* "Hodgson," Blanford, Mamm. Brit. India, p. 231, 1891—Darjeeling, India.

D. & L. 1929-30.—Mount Fan Si Pan (alt. 10,000 feet), near Chapa, T. 1 (alc.).

A single alcoholic specimen is evidently allied to the small long-tailed shrew of northern India. No Indian specimens are at hand, but comparison with a specimen of *S. irene* (probably a subspecies of *leucops*) shows the skulls to be very similar, that of *irene* being slightly larger. Measurements taken from the alcoholic specimen are: total length 163; tail 95; hind foot with claws 15.8. Greatest length of skull 17.7.

***Soriculus baileyi* Thomas. BAILEY'S LONG-TAILED SHREW.**

*Soriculus baileyi* Thomas, Jour. Bomb. Nat. Hist. Soc., 22, p. 683, 1914—Tsu River, Mishmi Hills, India.

D. & L. 1929-30.—Mount Fan Si Pan (alt. 10,000 feet), near Chapa, T. 11 (1 skin and skull, 3 skins, 7 alc.).

No comparison of these specimens with the type of *S. baileyi* has been made, but measurements indicate they are closely similar to if not identical with it. The tail length in the eleven specimens ranges from 68 mm. to 76 with an average of 70. Greatest length of skull 21.1; width of braincase 10.1; width of palate with molars 5.4; upper toothrow 9 (9.6);<sup>1</sup> front of i<sup>1</sup> to front of p<sup>4</sup> 4.1 (4.3); combined length of three large unicuspid 2.5 (2.7); height of first unicuspid 1.1 (1.2); length of mandible with incisor 13.3 (14.1).

The genus *Soriculus* has not been recorded before from Indo-China.

***Sorex minutus thibetanus* Kastschenko.**

*[Sorex] minutus* subsp. *thibetanus* Kastschenko, Survey of Mammals of Western Siberia and Turkestan,† p. 93, Tomsk, 1905—Tsaidam, Mongolia

K.-R.—Muli, Szechwan (10 miles north) 1.

A single tiny shrew obtained by Jack Young may be assigned provisionally to this form. Collector's measurements are: total length 80; tail 33; hind foot 11. The skull is very small with a low, flattened braincase and the fifth upper unicuspid is relatively large but low-crowned and without pigmentation. The greatest length of the skull is 15.1; width of braincase 6.5; upper toothrow 6.5.

***Panthera pardus delacouri* Pocock. LEOPARD.**

*Panthera pardus delacouri* Pocock, Jour. Bomb. Nat. Hist. Soc., 34, p. 325, pl. 11, July 15, 1930—Huê, Annam.

K.-R.—Phong Saly, L. 2 (skulls).

REC. 1925-29.—Huê, A. 1.

\* Measurements in parentheses are those published for the type of *baileyi*.

† Translated title furnished through the courtesy of M. A. C. Hinton.

D. & L. 1929-30.—Huê, A. 1 (type, skin and skull); Quangtri, A. 1 (pelt).

WULSIN 1924. Baxat, L.? 1 (skull).

The leopard of Indo-China has been distinguished recently by Pocock, the type being a specimen in the Delacour and Lowe collection of 1930. His characterization is as follows: "A race from Annam, recalling *japonensis* in colour but with the rosettes smaller and closer set and with darker centres, and the coat on the body and tail as short and sleek as in the typical Indian panther."

**Panthera tigris** Linnaeus. TIGER.

*Felis tigris* Linnaeus, Syst. Nat., ed. 10, p. 41, 1758 Asia.

K.-R.—Phong Saly, L. 1 (skull); Vientiane, L. 1 (skull).

D. & L. 1929-30.—Chapa, T. 2 (pelts).

**Felis (Neofelis) nebulosa** Griffith. CLOUDED LEOPARD.

*Felis nebulosa* Griffith, Descr. Vert., p. 37, 1821—Canton, China.

K.-R.—Near Lao Kay, T. 1 (pelt).

**Felis (Profelis) temmincki dominicanorum** Sclater.

*Felis dominicanorum* Sclater, Proc. Zool. Soc. Lond., p. 2, pl. 1, 1898—Foochow, Fukien, China.

K.-R.—Lao Fou Chai, L. 1 (pelt); Luang Prabang, L. 1 (pelt).

D. & L. 1929-30.—Huê, A. 1; Lao Bao, A. 1 (pelt).

REC. 1925-29.—Bao Ha, T. 1; Xieng Kuang, L. 1.

Both color phases are represented, one wholly grayish brown and the other wholly bright ochraceous. The skin from Lao Fou Chai, probably of an immature animal, has very soft, long fur and the tail is indistinctly annulated.

**Felis (Pardofelis) marmorata** Martin. MARBLED CAT.

*Felis marmorata* Martin, Proc. Zool. Soc. Lond., p. 108, 1836—"Java or Sumatra."

D. & L. 1929-30.—Chapa, T. 1 (pelt).

REC. 1925-29.—Backan, T. 1.

This cat is evidently rare in the region, the records apparently being the most northeastern for the species.

**Felis (Zibethailurus) viverrina** Bennett. FISHING CAT.

*Felis viverrina* Bennett, Proc. Zool. Soc. Lond., p. 68, 1833—India.

REC. 1925-29.—Saigon, C.C. 1.

**Felis (Felis) affinis fulvidina Thomas. JUNGLE CAT.**

*Felis affinis fulvidina* Thomas, Proc. Zool. Soc. Lond., p. 834, 1929—Tay Ninh, Cochin China.

REC. 1925-29.—Tay Ninh, C.C. 1.

**Felis (Prionalurus) bengalensis Kerr. LEOPARD CAT.**

*Felis bengalensis* Kerr, Anim. King., p. 151, 1792—Calcutta, India.

K.-R.—Ba Nam Nhung, T. 1; Muong Moun, T. 4; Muong Yo, L. 1; Phong Saly, L. 2.

D. & L. 1929-30.—“Annam,” 2; Hoi Xuan, A. 1; Huê, A. 1; Kratie, C. 1; Lao Bao, A. 1; Pakha, T. 3; Quangtri, A. 1.

DEL. 1931-32.—Thateng, L. 1.

REC. 1925-29.—Backan, T. 11; Huê, A. 1; Ngai Tio, T. 1; Nganson, T. 1; Quang Ngai, A. 1; Quangtri, A. 1; Tay Ninh, C.C. 3; Xieng Kuang, L. 8.

WULSIN 1924.—Lai Chau, T. 1.

The small series from Tonkin and Laos taken by the Kelley-Roosevelts Expedition shows relatively little variation. One old male has the spots of the upper parts much enlarged and with a tendency to confluence into broad stripes. The others vary within quite narrow limits, the ground color light ochraceous with medium-sized black spots and stripes regularly arranged.

Flesh measurements of two adult males are: total length 873, 870; tail vertebrae 300, 315; hind foot 130, 125. Two adult females: 795, 783; 305, 284; 115, 117.

**Felis (Prionalurus) chinensis Gray. CHINESE LEOPARD CAT.**

*Felis chinensis* Gray, Ann. Mag. Nat. Hist., n.s., 1, p. 577, 1837—China.

K. R.- Phouc Mon, Quangtri, A. 1.

In a preliminary examination of the spotted cats of the Kelley-Roosevelts collection, this specimen was noted as so distinct from all others that it was taken to London for comparison with material in the British Museum. An unexpected result was the discovery that it is practically identical with Gray's type of *Felis chinensis*, which is preserved in good condition and which is supposed to have come from Canton. The specimen is a female measured, skinned, and “made up” by Hendee, so there is no question of locality or data. It has a short tail, small feet, and spots reduced to very small flecks except on the legs and under parts where they are much

as in *bengalensis*. Its body color is that of a finely speckled animal rather than that of one heavily spotted or striped. The black spots on the body are numerous, but very small, not exceeding 8 mm. in diameter. The markings about the head, legs, and under parts are as usual in *bengalensis*, but there the resemblance ceases. The common pattern of large spots and stripes on the back and sides is lacking. The small spots are regularly distributed over a ground color of two shades of grayish buff and do not show any tendency to confluence.

Flesh measurements taken by the collector are: total length 697; tail 239; hind foot 108. The skull, so far as preserved, shows no marked departure from that of *bengalensis*. The teeth are smaller than in any specimen of *bengalensis* examined, the length of the carnassial being 9.4 (in *bengalensis* 10–10.6).

This specimen goes so far beyond the wide variation known in *bengalensis* that it seems to require some special explanation, but it is difficult to find any. Its agreement with the type of *chinensis* suggests the possibility that a coastal race may occupy the area from Annam to Canton without ranging inland. In the Delacour and Lowe collection, however, there are specimens supposed to come from the coast of Annam which do not differ greatly from the usual *bengalensis*. The exact localities for these specimens are open to slight question and it is not impossible that they may have been brought from a distance. A specimen from the island of Hainan, as described by J. A. Allen (Bull. Am. Mus. Nat. Hist., 22, p. 478, 1906), seems, on the other hand, to have the speckled coloration somewhat as in the type of *chinensis* and the specimen from Quangtri under consideration.

The possibility of hybridism, perhaps with the domestic cat, cannot be entirely excluded, but it is difficult to accept the idea that this specimen is a mere color variant of *bengalensis*. Since it agrees with the type of *chinensis*, it is treated under that name and other small spotted cats from Indo-China are referred to *bengalensis*.

### ***Felis (Prionalurus) scripta* Milne-Edwards. SZECHWAN CAT.**

*Felis scripta* Milne-Edwards, Nouv. Arch. Mus. Hist. Nat., Paris, 7, p. 92, 1870; Rech. Mamm., p. 341, pls. 57, 58, 1870–74—Mouping, Szechwan.

K.-R.—Tatsienlu, Szechwan 1.

This specimen agrees well with the description and figures of Milne-Edwards and doubtless is a good representative of the cat

named *scripta*. Whether this animal is more than subspecifically separable from *bengalensis* and whether or not it is distinguishable from *microtis* of Peking are questions for future determination.

***Viverra zibetha* Linnaeus. LARGE INDIAN CIVET.**

*Viverra zibetha* Linnaeus, Syst. Nat., ed. 10, p. 44, 1758—Bengal, India.

K.-R.—Ba Nam Nhung, T. 2; Muong Mo, T. 1; Muong Yo L. 2; Lai Chau, T. 1; Nguluko, Yunnan 1.

D. & L. 1929-30.—Chapa, T. 1; Hoi Xuan, A. 3; Huê, A. 1; Lao Bao, A. 1; Quangtri, A. 1.

REC. 1925-29.—Backan, T. 5; Bao Ha, T. 1; Dakto, A. 1; Kontoum, A. 1; Phu Rieng, C.C. 1; Quangtri, A. 1; Xieng Kuang, L. 2.

Following Allen (Am. Mus. Novit., No. 359, p. 1, 1929), these are referred to the typical Indian form of this variable and widespread species, proper subdivision of which must await a more extensive study than has yet been made. Doubtless there are several recognizable races but attempts to delimit them so far have been unsatisfactory. If an Indo-Chinese form should be demonstrable, it would take the name *surdaster* (Thomas, Proc. Zool. Soc. Lond., p. 46, 1927).

***Viverra megaspila* Blyth. BURMESE CIVET.**

*Viverra megaspila* Blyth, Jour. As. Soc. Beng., 31, p. 331, 1862—Prome, Lower Burma.

K.-R.—Saigon, C.C. 1.

REC. 1925-29.—Tay Ninh, C.C. 1 (pelt).

***Viverricula malaccensis* Gmelin. SMALL INDIAN CIVET.**

*Viverra malaccensis* Gmelin, Syst. Nat., ed. 13, p. 92, 1788—Malacca.

K.-R. - Phong Saly, L. 2; Phouc Mon, Quangtri, A. 3; Saigon, C.C. 1.

D. & L. 1929-30.—Chapa, T. 2; Kratie, C. 1; Pakha, T. 1; Phang Ran, A. 2; Saigon, C.C. 2.

DEL. 1931-32.—Bomkieng, L. 1.

REC. 1925-29.—Dakto, A. 1; Langson, T. 4; Napé, L. 2; Ngai Tio, T. 3; Phu Rieng, C.C. 2; Thuy Ba, Quangtri, A. 2.

As between *V. malaccensis* of the Malay States and *V. m. pallida* of southeastern China, the Indo-Chinese small civets undoubtedly fall with the southern form which is smaller and has the upper side



of the terminal part of the tail more extensively whitish. In the absence of material from Siam representing *V. m. thai* (Kloss, Jour. Nat. Hist. Soc. Siam, 3, p. 352, 1919), no attempt has been made at any finer distinction than that between *malaccensis* and *pallida*. Geographical probabilities, however, favor the assumption that gradation between *malaccensis* and *pallida* should be found somewhere in Siam or Indo-China.

**Prionodon (Pardictis) pardicolor** Hodgson. SPOTTED TIGER CIVET.

*Prionodon pardicolor* Hodgson, Calcutta Jour. Nat. Hist., 2, p. 57, pl. 1, figs. 3, 6, 1842—Nepal.

*Pardictis pardicolor presina* Thomas, Proc. Zool. Soc. Lond., p. 499, 1925—Ngai Tio, Tonkin.

D. & L. 1929-30.—Chapa, T. 6.

REC. 1925-29.—Backan, T. 3; Bao Ha, 'T. 1; "Hanoi," T. 1 (pelt); Ngai Tio, T. 1; Xieng Kuang, L. 2.

The series from Chapa shows some variation in size and depth of color and, although comparison with the type of "*presina*" has not been made, the inference is very strong that it cannot be maintained as a highland race. The specimens at hand have the throat, chest and inner sides of the legs rich ochraceous buff. Measurements of three adult males are: total length 350, 370, 372; tail 350, 335, 360; hind foot 62, 65, 62. Condyllo-basal length of an adult male skull is 71.6.

**Chrotogale owstoni** Thomas. OWSTON'S CIVET (Plate XI, facing p. 220).

*Chrotogale owstoni* Thomas, Proc. Zool. Soc. Lond., p. 500, 1912—Yen Bai, Songkoi River, Tonkin; *ibid.*, p. 499, 1925; *ibid.*, pp. 47-48, pls. 1, 2, 1927.

K.-R.—Muong Moun, T. 1.

D. & L. 1929-30.—Chapa, T. 2.

REC. 1925-29.—Nganson, T. 1; Thai Nien, T. 1 (pelt); "Tonkin," 4 (pelts); Xieng Kuang, L. 2 (1 pelt).

With the exception of the type, the specimens above listed include all known examples of this rare and interesting civet. The one from Muong Moun obtained by R. E. Wheeler is the first fully adult specimen with complete skin and perfect skull to be examined. Flesh measurements are: total length 1,010; tail vertebrae 490; hind foot 91. Skulls (♂ and ♀): greatest length 118.3, 105.2; condyllo-basal length 114, 102.3; palatal length 56.9, 51.8; zygomatic width

51.6, 50.3; interorbital constriction 15.9, 15.4; width of braincase 36.7, 34.9; median length of nasals 31, 26.5; width between audital bullae 11.6, 10.9; last molar to foramen magnum 53.8, 51; upper toothrow including canine 42.6, 36.5; space between canine and outer incisor 6, 5.9; width across outer incisors 14.4, 11.9; lower toothrow including canine 47.1, 40.9.

The two specimens from Chapa are male and female and very old with worn teeth and highly developed sagittal crests extending the entire length of the crania. In the male skull the audital bullae are extraordinarily reduced in size, being at least a third smaller than those in the mature skull from Muong Moun.

A feature of color not mentioned by Thomas is a narrow mid-ventral line of rich ochraceous extending from the breast to the inguinal region. The two dark markings on the upper side of the proximal part of the tail are essentially repetitions of the transverse markings of the back. They are confined to the top and sides of the tail and are not completed below. The terminal two-thirds of the tail is black all around.

The labels of both the specimens collected by Willoughby Lowe carry the notation that the stomachs contained earthworms. Although meager, this information is welcome as being the first intimation of the animal's habits which may have some relation to its peculiar dentition.

**Cynogale bennetti** Gray. WEB-FOOTED CIVET.

*Cynogale bennettii* Gray, Proc. Zool. Soc. Lond., p. 88, 1836—Sumatra.

REC. 1925-29.--Bacan, T. 1.

**Paradoxurus hermaphroditus laotum** Gyldenstolpe. COMMON PALM CIVET.

*Paradoxurus hermaphroditus laotum* Gyldenstolpe, Kungl. Svensk. Vet. Akad. Handl., 57, No. 2, p. 26, 1917—Chieng Hai, Siam.

*Paradoxurus birmanicus* Wroughton, Jour. Bomb. Nat. Hist. Soc., 25, p. 51, 1917—Mingun, near Sagaing, Upper Burma.

K.-R.—Saigon, C.C. 2.

D. & L. 1929-30.—Chapa, T. 1; Huê, A. 1; Kratie, C. 1; Lao Bao, A. 1.

DEL. 1931-32.—Thateng, L. 4.

REC. 1925-29.—Huê, A. 3; Kontoum, A. 1; Quangtri, A. 2; Tay Ninh, C.C. 2.

Among these specimens, several have no skulls and others are immature. Variation in size of teeth and audital bullae is considerable and identification is doubtful. Those from Cochin China should perhaps be referred to *cochinensis* (Schwarz, Ann. Mag. Nat. Hist., (8), 7, p. 635, 1911), but the relation of this to *minor* and *ravus* is not clear and variation is so great that without comparable material representing all the names proposed, there is little to be gained by attempts to identify individual specimens. One adult from Huê seems indistinguishable from *ravus*, and it is evident that the presence of black on the crown can be of significance only when applied as an average. The specimen from Chapa is a small female, rather more fulvous in color than usual. G. M. Allen has recently referred specimens from Hainan to *laotum*, a name which takes precedence over *birmanicus* used by Wroughton and Thomas. *P. exitus* Schwarz, from the vicinity of Canton, China, is still earlier and, since it was based on a single skull, there is little to show how *laotum* may differ from it.

#### **Paradoxurus crossi Gray.**

*Paradoxurus crossi* Gray, Proc. Zool. Soc. Lond., p. 66, 1832—Nepal.

D. & L. 1929-30.—Lung Lunh, A. 1.

A single specimen, not fully mature, may be referred provisionally to this species although it has not been compared with Indian material. Except for its dark tail, feet, and slight head markings, it is uniformly dull and faintly grizzled whitish without any suggestion of spots or stripes.

#### **Arctogalidia leucotis Horsfield. WHITE-EARED PALM CIVET.**

*Paradoxurus leucotis* Horsfield, Cat. East Ind. Mus., p. 66, 1851—Tenasserim.

DEL. 1931-32.—Paleng, L. 1; Thateng, L. 2.

REC. 1925-29.—Xieng Kuang, L. 1.

These appear to furnish the only records of this species from Indo-China.

#### **Arctictis binturong Raffles. BINTURONG.**

*Viverra binturong* Raffles, Trans. Linn. Soc. Lond., 13, p. 253, 1822—Sumatra.

REC. 1925-29.—“Tonkin,” 1.

#### **Paguma larvata H. Smith. MASKED PALM CIVET.**

*Gulo larvatus* H. Smith, Griffith's Anim. King., 2, p. 281, pl., 1827—no locality.

*Paguma larvata* Thomas, Ann. Mag. Nat. Hist., (8), 3, p. 377, 1909; G. M. Allen, Am. Mus. Novit., No. 359, p. 5, 1929—lower Yangtze Valley.

*Poguma larvata rivalis* Thomas, Ann. Mag. Nat. Hist., (9), 8, p. 618, Dec., 1921—Ichang on the Yangtze, southeastern Szechwan.

K.-R.—Baurong, Szechwan 1; Mouping, Szechwan 1.

G. M. Allen, after studying a large amount of material, has recently concluded that only two continental races of *P. larvata* are recognizable. These are *larvata* of central China, paler and more generally grayish, and *intrudens* of southwestern China, Burma, and Tonkin, darker and more rufescent. If this be correct, extremes of paleness might be expected in western Szechwan and of rufescence in Tonkin. This seems to be the case and specimens from Fukien, while doubtless referable to *larvata*, are perhaps somewhat intermediate.

The specimen from Mouping, which is the northernmost yet recorded, is very light-colored, especially on the sides where it is more silvery than any other specimen examined. The upper side of its tail is entirely black and this extends a short distance on the back. It agrees fairly well with the type of *rivalis* except in its tail which is unique. The type has the tail wholly light-colored, but the tip is missing. A topotype in bad condition has about two-thirds of the tail black and another specimen from Sui Ling, near Chungking, has a tail with the usual proportion of black. It is evident, therefore, that there may be much variation in markings and, although specimens from the upper Yangtze probably average paler than those from Fukien and the lower Yangtze, they are collectively separable from *intrudens* on the basis of paler color and further division seems unnecessary.

***Paguma larvata intrudens* Wroughton. SOUTHERN MASKED PALM CIVET.**

*Paguma larvata intrudens* Wroughton, Jour. Bomb. Nat. Hist. Soc., 19, p. 793, 1910—near Myitkyina, Upper Burma.

*Paguma larvata yunalis* Thomas, Ann. Mag. Nat. Hist., (9), 8, p. 617, Dec., 1921—Yen-Yuen-Sian, southern Szechwan.

K.-R.—Lai Chau, T. 1; Muong Moun, T. 1; Muong Mo, T. 1; Nguluko, Yunnan 1.

D. & L. 1929-30.—Chapa, T. 4; Huê, A. 1.

DEL. 1931-32.—Paleng, L. 1.

REC. 1925-29.—Backan, T. 1; Napé, L. 3; Xieng Kuang, L. 3.

The masked palm-civet of central Tonkin has been recorded by Thomas under the name *yunalis*, but this, as concluded by G. M. Allen (Am. Mus. Novit., No. 359, pp. 4-8, July, 1929), seems to be a synonym of *intrudens*. Yunnan specimens are essentially similar

to those from Tonkin although the usual minor variations are present. One of the Tonkin specimens is more grayish than the others and perhaps may be an indication of a slight dimorphism which would account for some of the wide variation recorded for the species. In this specimen, instead of cinnamon rufous, the back and the proximal part of the tail are olivaceous gray, somewhat the shade called by Ridgway Buffy Brown. The under parts are dull whitish instead of buffy. This specimen, therefore, is very similar to *larvata* from Fukien, whereas *intrudens* is usually more rufescent. In one example the nuchal white is expanded into a broad patch with scarcely any black between it and the cinnamon rufous of the back. In two others, this white is reduced to a narrow line surrounded by pure black, this latter extending to the interscapular region.

One individual, which externally appears quite as mature as the others, still retains its milk teeth, all of which have the crowns badly worn, indicating either that the teeth are retained for an unusually long time or that some exceptionally abrasive food is habitually taken.

*Paguma larvata vagans* (Kloss, Jour. Nat. Hist. Soc. Siam, 3, p. 73, 1918) from Siam has not been examined.

#### **Herpestes urva** Hodgson. CRAB-EATING MONGOOSE.

*Gulo urva* Hodgson, Jour. As. Soc. Beng., 5, p. 283, 1836—Nepal.

DEL. 1931-32.—Thateng, L. 1.

REC. 1925-29.—Backan, T. 10; Langson, T. 1; Phuqui, A. 2; Xieng Kuang, L. 2.

#### **Herpestes exilis** Gervais. ANNAM MONGOOSE.

*Herpestes exilis* Gervais, Voy. Bonite, 1, p. 32, pl. 3, figs. 7 9, 1841—Tourane, Annam.

K.-R.—Phouc Mon, Quangtri, A. 5.

D. & L. 1929-30.—Huê, A. 1.

REC. 1925-29.—Col des Nuages, A. 1; Huê, A. 3; Thula-hun, A. 2.

These show considerable variation and one specimen has the ferruginous of the head continued down the middle of the back to the base of the tail.

#### **Charronia flavigula** Boddaert. INDIAN MARTEN.

*Mustela flavigula* Boddaert, Elench. Anim., p. 88, 1785—northern India.

DEL. 1931-32.—Thateng, L. 1.

REC. 1925-29.—Dakto, A. 1; Huê, A. 1; Kontoum, A. 1.

***Mustela kathiah* Hodgson. YELLOW-BELLIED WEASEL.**

*Mustela (Putorius) kathiah* Hodgson, Jour. As. Soc. Beng., 4, p. 702, 1835—Nepal.

K.-R.—Lieng San, T. 1; Muong Mo, T. 1; Phong Saly, L. 1.  
D. & L. 1929-30.—Chapa, T. 5.

REC. 1925-29.—Xieng Kuang, L. 1.

No distinction appears between Indo-Chinese specimens and others from Nepal and Sikkim. Most of the specimens in the British Museum are females or without measurements. Collector's measurements of males and females of maximum size are, respectively: total length 487, 337; head and body 292, 207; tail 195, 130; hind foot 48, 35.

A specimen from Fukien, referred by G. M. Allen to *kathiah*, is much paler than Indian material, and if it has the normal color for that region it may be possible to recognize Matschie's *melli* or Milne-Edwards's *astutus*.

***Mustela sibirica moupinensis* Milne-Edwards. MOUPING WEASEL.**

*Putorius moupinensis* Milne-Edwards, Nouv. Arch. Mus. Hist. Nat., Paris, 7, p. 92, 1870—Mouping, Szechwan.

K.-R.—Baurong, Szechwan 1 (pelt); Tupakeo, Szechwan 1; Tiyu, Gomba, Szechwan 1.

An adult female taken Sept. 9 is still in summer pelage. Comparison with a specimen from Sikkim representing *subhemachalana* shows only such differences as might be of subspecific importance. The locality Tupakeo is only a few miles north of Mouping, so the specimen from there may be taken as topotypical.

***Mustela strigidorsa* Gray. STRIPED WEASEL.**

*Mustela strigidorsa* "Hodgson," Gray, Proc. Zool. Soc. Lond., p. 191, 1853—Sikkim.

K.-R.—Phong Saly, L. 1.

This is an adult female agreeing in every respect with the type which also is a female. Collector's measurements are: total length 436; tail 150; hind foot 49. Besides the type, there are in the British Museum four other specimens of this rare weasel, two from Sikkim, one from Nepal, and one from Upper Burma. The only other preserved specimen of which there is record seems to be that listed by Thomas from Thagata, Tenasserim (Ann. Mus. Civ. Stor. Nat. Gen., (2), 10, p. 10, 1892).

***Lutra tarayensis* Hodgson. SMOOTH INDIAN OTTER.**

*Lutra tarayensis* Hodgson, Jour. As. Soc. Beng., 8, p. 319, 1839—Terai, Nepal.

WULSIN 1924.—Mekong River, L. 1.

DEL. 1931–32.—Pakse, L. 1; Thateng, L. 9 (6 alc.).

REC. 1925–29.—Xieng Kuang, L. 1.

This appears to be the most common otter of the Mekong. The specimens are mostly immature, eight being newly born young.

***Lutra sumatrana* Gray. HAIRY-NOSED OTTER.**

*Lutra sumatrana* Gray, Proc. Zool. Soc. Lond., p. 125, fig., 1865—Sumatra.

REC. 1925–29.—“Annam,” 2.

***Lutra lutra chinensis* Gray. COMMON OTTER.**

*Lutra chinensis* Gray, Mag. Nat. Hist., (2), 1, p. 260, 1837—southeastern China.

K.-R.—Phong Saly, L. 1.

D. & L. 1929–30.—Chapa, T. 2; Hoi Xuan, A. 1; Huê, A. 1.

A partly grown otter from Laos belongs to the *lutra* series and probably should be referred to *L. l. chinensis*, a name recently used by G. M. Allen for specimens from Hainan and Fukien. Others from Tonkin and Annam, nearly adult, are rather small and characterized by white or buffy white chins. A female from Hoi Xuan has the entire interramial region and anterior throat nearly pure white to the roots of the hairs. Its skull has a condylo-basal length of 100 and zygomatic width of 68.8.

***Aonyx cinerea* Illiger. CLAWLESS OTTER.**

*Lutra cinerea* Illiger, Abhandl. Akad. Berlin, (1811), p. 99, 1815—Batavia, Java.

K.-R.—Lao Bao, A. 1.

DEL. 1931–32.—Thateng, L. 1.

A fine adult female obtained by Coolidge is in the collection. A somewhat younger female was taken by Delacour in Laos.

***Meles meles leucurus* Hodgson. ASIATIC BADGER.**

*Taxidea leucura* Hodgson, Jour. As. Soc. Beng., 16, p. 763, pls. 29–31, 1847—region of Lhasa, Thibet.

K.-R.—Near Hlagong, district of Tatsienlu, Szechwan 1.

A badger obtained by Stevens in the highlands of northwestern Szechwan is perhaps best referred to under the name *leucurus*.

Whether this differs from *leptorynchus*, recently used by G. M. Allen for Chinese badgers, may not be certain, but *leucurus*, having priority, will stand for some Asiatic form unless for other reasons it should be unavailable. Anderson (Yunnan Exped., 1, p. 197, 1878) states that he has compared the types of *leucurus*, *leptorynchus*, and *chinensis* without finding significant distinctions.

**Arctonyx collaris F. Cuvier. HOG BADGER.**

*Arctonyx collaris* F. Cuvier, Hist. Nat. Mamm., part 51, 2 pp., pl., 1825—Bhutan.

K.-R.—Tiyu, Gomba, Szechwan 1 (pelt).

A hunter's skin without skull from southwestern Szechwan may be referred to this species which G. M. Allen regards as ranging over all of southern China.

**Arctonyx collaris dictator Thomas. SIAMESE HOG BADGER.**

*Arctonyx dictator* Thomas, Ann. Mag. Nat. Hist., (8), 5, p. 424, 1910—Trang, lower Siam.

?*Arctonyx annaeus* Thomas, Ann. Mag. Nat. Hist., (9), 7, p. 524, 1921—Nhatrang, Annam.

K.-R.—Phong Saly, L. 2.

DEL. 1931-32.—Thateng, L. 4.

A complete skin and skull and an additional hunter's skin are in the collection. These agree in large size with *A. dictator* as described but differ from each other quite markedly in color. Collector's measurements of an adult male are: total length 909; tail 234; hind foot 126. Skull: greatest length 168; condylo-basal length 155; zygomatic width 87.2; least interorbital width 34.4; greatest diameter of upper molar 17.

Under the name *annaeus*, an immature specimen has been described from Nhatrang, Annam, and a skin without skull is recorded from Phuqui, Annam. No conclusive evidence is presented to distinguish them from *dictator*, and until this is forthcoming it seems best to consider the name *annaeus* of doubtful status. Specimens from southern Laos are fully as large as northern ones.

**Helictis moschata ferreo-grisea Hilzheimer. CHINESE FERRET BADGER.**

*Helictis ferreo-griseus* Hilzheimer, Zool. Anz., 29, p. 298, 1905—Hankau, Hupeh, China.

K.-R.—Baurong, Szechwan 1 (pelt).



A hunter's skin without skull obtained by Stevens is tentatively referred to this form which G. M. Allen has regarded as occupying a considerable range in China. It is somewhat paler and more hoary than specimens from Fukien and its ears are entirely light-colored instead of being darker behind.

***Helictis taxilla* Thomas. TONKIN FERRET BADGER.**

*Helictis taxilla* Thomas, Proc. Zool. Soc. Lond., part 2 (1925), p. 500, July, 1925—Ngai Tio, Tonkin.

K.-R.—Phong Saly, L. 5.

D. & L. 1929-30.—Chapa, T. 15.

REC. 1925-29.—Ngai Tio, T. 2; Xieng Kuang, L. 8.

In this large series the extent and arrangement of the white markings about the head are fairly constant. In a few the brown spot behind the eye is almost entirely wanting, and in others the white on the cheeks is considerably reduced. The color of the under parts is more variable, the extent of pale, or ochraceous, self-colored hairs ranging from one in which the entire under parts and the front sides of the fore and hind legs are included to others in which the legs are wholly dark all around and in which the color of the sides invades the under parts almost to the midventral line. In several a prominent white spot is developed on each side of the front of each hind leg near its junction with the body. Measurements of five males as taken by the collector are as follows: total length 464 (437-504); tail 143.4 (131-151); hind foot 59.2 (58-62).

***Helictis (Melogale) personata laotum* Thomas. BURMESE FERRET BADGER.**

*Melogale personata laotum* Thomas, Ann. Mag. Nat. Hist., (9), 9, p. 194, Feb., 1922—Nan, Siam.

?*Melogale tonquinia* Thomas, supra cit., p. 195—Yen Bai, Songkoi River, Tonkin.

K.-R.—Phouc Mon, Quangtri, A. 2.

D. & L. 1929-30.—Huê, A. 2.

DEL. 1931-32.—Thateng, L. 5.

REC. 1925-29.—Huê, A. 5; Kontoum, A. 1.

Three of these are fine adults which agree in measurements with those given for the subspecies *laotum*. In the original description, Thomas suggested this form might range into Annam.

The status of *H. tonquinia*, which was based on a single immature female, seems doubtful. There is considerable variation in

the size of the teeth of specimens from one region, but the teeth in the type of *tonquinia* are exceeded in size by all other available specimens.

As suggested by Allen (Am. Mus. Novit., No. 358, p. 6, 1929), the recognition of *Melogale* as a full genus seems inadvisable, such a course being only a means of obscuring obviously close relationships. The characters of the baculum adduced by Thomas probably need further confirmation. In these specimens taken at the same time and place, the baculum is bifid in one case and trifid in the other or at least with a definite third protuberance.

***Helictis (Melogale) personata pierrei* Bonhote.**

*Helictis pierrei* Bonhote, Ann. Mag. Nat. Hist., (7), 12, p. 592, 1903—Saigon, Cochin China.

REC. 1925-29. - Djiring, A. 1.

In recording the specimen from Djiring, Annam, under this name, Thomas (1928, p. 146) says, "Whether *pierrei* is really different from *personata* remains to be seen." The same is probably true as to whether or not *laotum* differs from *pierrei* and, although material representing *laotum* is now abundant, that of *personata* and *pierrei* is still scanty.

***Cuon rutilans* Muller. WILD DOG.**

*Canis rutilans* Muller, Verhandl. Zool. Zoogd., pp. 27, 51, 1839—"Bengal." K.-R.—Saigon, C.C. 1.

D. & L. 1929-30.--Kontoum, A. 1.

DEL. 1931-32.- Thateng, L. 1.

REC. 1925-29. - Backan, T. 1 (pelt).

***Vulpes vulpes* subsp. COMMON FOX.**

K. R. "Szechwan," 1 (pelt).

This probably represents Matschie's *aurantiobuteus*, but a series of specimens will be necessary to determine its proper status.

***Nyctereutes procyonoides* Gray. RACCOON DOG.**

*Canis procyonoides* Gray, Illus. Ind. Zool., 2, pl. 1, 1834—southeastern China.

REC. 1925-29.—Langson, T. 2.

***Helarctos malayanus* Raffles. MALAY BEAR.**

*Ursus malayanus* Raffles, Trans. Linn. Soc. Lond., 13, p. 254, 1822—Sumatra.

K.-R.--Lao Fou Chai, L. 1 (skull).

DEL. 1931-32.—Thateng, L. 1 (juv.).

REC. 1925-29.--Huê, A. 1; Quangtri, A. 1.

The skull of an exceptionally large male was obtained in Laos by Coolidge. This has a zygomatic width of 223 mm. (8.75 inches) and the estimated basal length is about the same. This is perhaps the maximum size for the species since the largest skull examined by Blanford is recorded as "8.5 inches long (basal length) and 8.3 broad."

***Selenarctos thibetanus* subsp. HIMALAYAN BLACK BEAR.**

K.-R.—Lao Fou Chai, L. 2 (skulls).

D. & L. 1929 30.—Huê, A. 1 (skull).

These unsexed skulls appear to be about the same size as others recorded from northern India and they scarcely can be referred to *melli* of Fukien, which is supposed to be much smaller. The upper molar in two skulls measures 27–28 mm. in length.

***Ailurus fulgens styani* Thomas. SMALL PANDA.**

*Ailurus fulgens styani* Thomas, Ann. Mag. Nat. Hist., (7), 10, p 251, 1902 – Yang-liu-pa, northwestern Szechwan.

K.-R.—Baurong, Szechwan 1 (pelt); Tiyu, Gomba, Szechwan 1 (pelt); Wushi, Szechwan 1 (pelt).

Three hunter's skins, purchased by Stevens, are practically complete but without skulls or measurements. They exhibit considerable variation in color apparently due mainly to season. One which is doubtless in unworn winter coat is very rich and dark, the entire median upper parts and the lighter annulations of the tail Mahogany Red to Chestnut. The dark annulations of the tail and a broad tip are black. In another, more worn, the head and shoulders are still Chestnut but the darker annulations of the tail and the remaining upper parts are Cinnamon Rufous to Hazel. The lighter annulations of the tail are Ochraceous Buff and the narrow tip brownish. A third, still more worn, has the lighter rings of the tail Light Buff, almost whitish.

***Ailuropoda melanoleuca* David. GIANT PANDA.**

*Ursus melanoleucus* David, Nouv. Arch. Mus. Hist. Nat., Paris, 5, Bull., p. 13, 1869—Mouping, Szechwan.

*Ailuropoda melanoleuca* Milne-Edwards, Ann. Sci. Nat., Paris, (5), Zool., 13, art. 10, 1870.

*Ailuropus melanoleucus* Milne-Edwards, Nouv. Arch. Mus. Hist. Nat., Paris, 7, Bull., p. 92, 1871; Rech. Mamm., pp. 321–328, pls. 50–60, 1873.

K.-R.—Yachow district, Szechwan 1 (skin and skull); Yehli district, Szechwan 6 (1 skin and skeleton, 5 pelts).

As variously announced elsewhere, the crowning exploit of the Kelley-Roosevelts Expedition was the trailing and shooting of a giant panda by the brothers Theodore and Kermit Roosevelt. This took place April 13, 1929, in the Yehli district of southwestern Szechwan. The skin of the animal and the complete skeleton were carefully preserved and reached Field Museum in excellent condition. Besides the skin of the one shot by themselves, the Roosevelts were able by purchase or barter to obtain from native sources several additional skins, mostly bereft of feet and claws and otherwise somewhat imperfect but of much value for comparative purposes. One of these served as a companion piece with the perfect one in making a habitat group which has been installed in William V. Kelley Hall of Field Museum. Since the return of the Roosevelts a further complete skin with skull and leg bones has been received by Field Museum. This was obtained at the instance of the Roosevelts by L. R. Crook of Yachow, Szechwan.

The following notes on the habits and distribution of the animal have been published by the Roosevelts.<sup>1</sup> "The natives know him as the *beishung* or white bear. To the best of our judgment he has a fairly wide area of distribution but is to be found only in pockets, and is never abundant even in these pockets. He lives in bamboo jungles in altitudes varying between six and fourteen thousand feet. We came to the conclusion that where there were no bamboo jungles, there were no *beishung*. . . . Where he actually exists, his droppings are frequent and easy to find, and even easier to identify. They are egg-shaped, from five to seven inches in length (for the adult) and composed of partially digested bamboo shoots. The Muping and Yehli districts were the only places where, after diligent and unceasing inquiry throughout the trip, we could be convinced of the presence of the giant panda. . . .

"The *beishung* does not hibernate. We found fresh signs in regions where the brown and black bears were hibernating, and the one we shot was living in a locality where the black bears had not yet awaked from their winter's nap. We came upon his tracks one morning in the newly fallen snow. They were partly obliterated, for four or five hours had passed since he went by. Three hours' trailing through dense jungle brought us to the spot which he had

<sup>1</sup>Theodore and Kermit Roosevelt, *Trailing the Giant Panda*, Charles Scribner's Sons, New York, 1929.

selected for his siesta. We caught sight of him emerging from the hollow bole of a giant fir tree, and fired simultaneously."

The complete skeleton of *Ailuropoda* included in this collection is especially deserving of a thorough study which doubtless will throw further light on the relationships of the animal. Superficial observations, therefore, are deferred until such a study can be made.

**Petaurista lylei badiatus** Thomas. BAY FLYING SQUIRREL.

*Petaurista lylei badiatus* Thomas, Proc. Zool. Soc. Lond., p. 501, 1925—Ngai Tio, Tonkin.

K.-R.—Muong Boum, T. 1; Muong Moun, T. 2; Tuan Gao, T. 2.  
D. & L. 1929-30.—Chapa, T. 5.

DEL. 1931 32.—Phukong Ntoul, L. 1.

REC. 1925-29.—Dalat, A. 1; Ngai Tio, T. 3; Phuqui, A. 1; Xieng Kuang, L. 1.

Two magnificent specimens have the following measurements, taken by the collector: total length 1,125, 1,025; tail 635, 580; hind foot 94, 90.5. The largest skull has the occipito-nasal length 80.2.

No comparison has been made with typical *lylei* from neighboring localities in northern Siam.

**Petaurista annamensis** Thomas. ANNAM FLYING SQUIRREL.

*Petaurista annamensis* Thomas, Jour. Bomb. Nat. Hist. Soc., 23, p. 204, 1914—Bali, near Nhatrang, Annam.

REC. 1925-29.—Kontoum, A. 1; Tay Ninh, C.C. 3.

This is regarded by Thomas as a distinct species occurring in the same region with *badiatus*, but the characters assigned to it seem very slight and likely to be subject to variation.

**Petaurista marica** Thomas. SPOTTED FLYING SQUIRREL.

*Petaurista marica* Thomas, Ann. Mag. Nat. Hist., (8), 9, p. 687, 1912—near Mongtze, Yunnan.

D. & L. 1929-30.—Chapa, T. 1.

REC. 1925-29.—Xieng Kuang, L. 1.

**Pteromys (Hylopetes) alboniger** Hodgson. BLACK AND WHITE FLYING SQUIRREL.

*Sciuropterus alboniger* Hodgson, Jour. As. Soc. Beng., 5, p. 231, 1836—Nepal.

K.-R.—Muong Moun, T. 1.

REC. 1925-29. Dakto, A. 4; Djiring, A. 1; Huê, A. 1; Kontoum, A. 2.

DEL. 1931-32. Pakse, L. 1.

The specimen from Tonkin agrees closely with examples from Hodgson's original series. It is a small female and somewhat smaller than others from Annam previously recorded by Thomas.

***Pteromys (Hylopetes) spadiceus* Blyth. BROWNISH FLYING SQUIRREL.**

*Sciuropterus spadiceus* Blyth, Jour. As. Soc. Beng., 16, p. 867, pl. 36, fig. 1, 1847—Arakan, India.

REC. 1925-29.—Kontoum, A. 1.

DEL. 1931-32.—Paleng, L. 1; Thateng, L. 2.

***Belomys pearsoni blandus* subsp. nov.**

*Type* from Muong Moun, south of Lai Chau, Tonkin. No. 32,312 Field Museum of Natural History. Adult male. Collected March 16, 1929, by J. Van Tyne. Orig. No. 32.

*Diagnosis*.—Similar to *B. pearsoni* of Sikkim, but smaller, with decidedly smaller teeth and shorter, broader nasals. Similar to *B. trichotis* but with rufescent instead of white under parts.

*Color*.—Practically as in *B. pearsoni*, rich ochraceous shades prevailing throughout.

*Skull*.—Markedly smaller than in *pearsoni*, slightly smaller than in *trichotis*; nasals broad, scarcely diminishing in width posteriorly; teeth relatively small.

*Measurements*. Type, measured in flesh by collector: total length 373; tail 180; hind foot 38. Skull: greatest length 41.5; basilar length 34.5; zygomatic breadth 24.7; mastoid breadth 21.5; length of nasals 11.5; breadth of nasals behind 4.5; upper toothrow 8.9 (10.1 in *pearsoni*).

*Remarks*.—This is doubtless only a slight western form of *B. pearsoni*. A specimen from Bao Ha, Tonkin, in the British Museum is without skull or measurements and was recorded by Thomas (1925, p. 501) with no specific designation. Comparison has been made with two specimens in the British Museum from Sikkim and Assam, representing *pearsoni*, and two from Chindwin, Burma, representing *trichotis*. The new form seems to agree with *pearsoni* in color, while in size and cranial characters it is nearer to *trichotis*.

*B. kaleensis* of Formosa is closely similar in color, but in this also the teeth are large.

*Specimens examined.* Chapa, T. 1 (D. & L. 1929-30); Muong Moun, T. 1 (K. R.).

***Ratufa bicolor smithi* Robinson and Kloss. SMITH'S GIANT SQUIRREL.**

*Ratufa bicolor smithi* Robinson and Kloss, Ann. Mag. Nat. Hist., (9), 9, p. 89, 1922—Langbian Peaks, Annam.

REC. 1925-29. —Djiring, A. 3; Tay Ninh, C.C. 2.

***Ratufa melanopepla leucogenys* Kloss. WHITE-CHEEKED GIANT SQUIRREL.**

*Ratufa melanopepla leucogenys* Kloss, Proc. Zool. Soc. Lond., p. 43, 1916 — Lem Ngop, southeastern Siam.

REC. 1925-29.—Sambor, C. 1.

***Ratufa gigantea* McClelland. GIANT SQUIRREL.**

*Sciurus giganteus* McClelland, Proc. Zool. Soc. Lond., p. 150, 1839—Assam, India.

K.-R.—Near Lao Fou Chai, L. 1; Muong Yo, L. 2; Phong Saly, L. 1.

D. & L. 1929-30.—Bolovent, L. 1; Chapa, T. 2; Hoi Xuan, A. 1.

DEL. 1931-32.—Banphone, L. 2; Bantion, L. 1; Thateng, L. 3.

REC. 1925-29.—Napé, L. 4; Phuqui, A. 8; Tam Dao, T. 5; Xieng Kuang, L. 1.

As compared with a series from Sikkim, Indo-Chinese specimens show no pronounced difference in color, but their skulls are characterized by various minor peculiarities including darker-colored incisors, narrower nasals, and larger, higher, audital bullae. Since no material from Assam or Hainan is at hand, the determination of the subspecific status of these specimens has not been attempted.

***Callosciurus erythraeus hendeei* subsp. nov. HENDEE'S TONKIN SQUIRREL.**

*Type* from Chapa, Tonkin. No. 32,290 Field Museum of Natural History. Adult male. Collected Feb. 14, 1929, by Russell W. Hendee. Orig. No. 5,168.

*Diagnosis.*—Similar to *C. e. castaneoventris* of Hainan, but larger and darker, the feet more blackish, the ears more ochraceous, and

the fore legs and facial region paler grayish. Similar to *C. e. nagarum* of Assam but coloration throughout slightly darker and more intense, the feet with intense black toes instead of merely sooty, the outer sides of the ears more definitely ochraceous, and the back less uniform. Similar to *C. e. gordonii* but less brownish in color throughout and usually without a midventral stripe.

*Color.*—Upper parts finely grizzled throughout usually producing a general olivaceous effect; middle of back varying from a color practically like that of the sides to a concentration of brownish or blackish which in extreme cases takes the form of a definite dark median line from the shoulders to the rump; outer sides of fore and hind legs slightly more grayish than body; sides of face and chin rather more grayish than surrounding parts; under parts clear deep ferruginous (Mahogany Red of Ridgway), rarely with traces of a grizzled median stripe on chest; feet and hands proximally blackish with a fine speckling of gray, distally intense clear black including all of toes; ears grizzled within, pale buffy ochraceous without or even whitish in rather sharp contrast to surrounding pelage; tail with the hairs having three to four broad bands of black alternating with pale whitish to ochraceous light bands, the terminal band being light and in fresh condition dominating the color of the entire tail. The subterminal band on the tail hairs is much broader than the others and gradually widens toward the tip where it finally extends to the roots of the hairs and may, when the terminal light band is worn away, produce a long wholly black brush at the end of the tail.

*Skull.*— Smaller throughout than in *castaneiventris* and *ningpoensis*.

*Measurements.*— Type: total length 437; tail 213; hind foot 55. Skull of type: greatest length 55; condylo-basal length 51; zygomatic width 32.6; interorbital width 28.8; upper toothrow 10.2.

*Remarks.*— A study of the entire group to which it belongs has been necessary before coming to the conclusion that this squirrel from Tonkin and Laos should be named. In 1925, when Thomas first reported on mammals from Tonkin, he referred specimens from Thai Nien and Bao Ha to *castaneiventris*, a species described by Gray from a specimen collected by Reeves in China and having no exact locality. Robinson and Kloss (Rec. Ind. Mus., 15, p. 199, 1918) had previously expressed the opinion that Gray's type could not be distinguished from the squirrel of the island of Hainan named *insularis* by Allen (Bull. Am. Mus. Nat. Hist., 22, p. 473, 1906).



Therefore, they proposed that Hainan be accepted as the type locality of *castaneoventris* and that *insularis* fall as a synonym. Thomas, finding his Tonkin specimens very similar to others from Hainan, agreed with Robinson and Kloss as to the disposition of *insularis*, but not as to the type locality of *castaneoventris* which he thought more likely to be the "mainland of southwestern China, more or less in the region of Canton." A reexamination of the subject with large series from both Tonkin and Hainan leads me to agree, at least for the present, with Robinson and Kloss rather than with Thomas, whose material from Hainan in the British Museum was very scanty and inconclusive.

Gray's type of *castaneoventris* is an old specimen considerably shrunken, but apparently not much altered in color. It cannot be distinguished in any way from Hainan specimens, whereas it differs from the Tonkin form in the various characters enumerated above, including size, color of feet, ears, facial region, etc. The whitish-tipped tail appears to be of less importance for distinguishing the Hainan form than these other characters, for both whitish and ochraceous tails are found on the mainland. The type does agree with the Tonkin form in the color of the under parts, however, and in this respect it differs from specimens from the mainland of China in the Fukien region which are somewhat more richly colored than those called *ningpoensis* from farther north. No specimens have been examined from the region between Fukien and Tonkin, and it is quite possible or even probable that when these are obtained they will prove to have still darker under parts and furnish a better basis for the supposition of Thomas that the type came from the region of Canton. Until then it seems necessary to assume Hainan as the type locality and in any case the distinction of a separate form in Tonkin is justified.

Having distinguished the Tonkin squirrels from *castaneoventris*, it becomes necessary to consider their affinities with forms to the north and west, the chief of these being *nagarum* and *gordoni*. From *gordoni* they differ in more grayish coloration, in their light-colored contrasting ears, and in the absence of a well-defined midventral stripe. In a series of more than a hundred from Tonkin, Annam and Laos, only three show traces of a midventral stripe. These are specimens in the British Museum from Backan, Chora, and Tam Dao, eastern Tonkin, and they also show the most definite blackish dorsal stripes in the series. Slight tendency to concentration of blackish or brownish in the middorsal region appears occasionally

in specimens throughout Tonkin, a character which is doubtless variable but which has not been observed in any other subspecies of the *erythraeus* series unless *atrodoersalis* and its forms be included. In fact, these dark-backed specimens with a slight midventral line, although very much darker, are quite suggestive of *C. atrodoersalis* of northern Siam and the possibility that *atrodoersalis* and *erythraeus* may inosculate is probably still to be considered.

In one of his later papers on Indo-Chinese mammals, Thomas (1929, p. 836) refers a large series of squirrels from Phuqui, Annam, to subspecies *nagarum*, evidently being especially influenced by the black-tipped tails which are shown throughout the series. A study of these and others, however, seems to indicate that the black at the end of the tail may be exposed by the wearing away of the light tips to the hairs to such an extent that the terminal third of the tail becomes wholly black. There is variation both individual and local which may partially account for some cases, but it is certain that wear is largely responsible for it. In spite of the large number of specimens of the *erythraeus* series that are in collections, very few are available to give any range of pelage changes due to season. Nearly all collectors have worked in the dry or winter season, from December to March, and, although pelage changes may be inferred, they cannot be followed in detail. Specimens in Field Museum from northern Laos and Tonkin include some with unworn tails, having fresh light tips to the hairs and others in which the terminal part of the tail is black and evidently not in fresh condition. Also, in a large series of *gordoni* in the British Museum, all from one locality, both conditions may be seen.

The distinction of *hendeei* and *nagarum* consists mainly in the general more saturate color of the former. This extends to all parts and wherever special comparison is made is found to hold true. The under parts in *hendeei* are the Mahogany Red of Ridgway while those of *nagarum* are several shades lighter, Sanford's Brown or, at most, not stronger than Burnt Sienna. The upper parts also average paler in *nagarum* and the ears, although having light pre-ototes, are not so sharply marked and contrasted as in *hendeei*. In *nagarum*, the feet are grizzled to the claws, whereas in *hendeei* the toes and often the sides of the feet are intense pure black.

The *Sciurus erythraeus pranis* of Kloss, from southwestern Siam, which was later considered by its describer as allied to *atrodoersalis*, has not been seen, but the description indicates a much paler animal with a gray pectoral line.

*Specimens examined*.—Total number 110, from the following localities: Annam: Iloi Xuan 2;<sup>1</sup> Lung Lunh 3;<sup>2</sup> Phuqui 3,<sup>2</sup> 24;<sup>1</sup> Than Hoa 1.<sup>1</sup> Laos: Lao Fou Chai 1;<sup>1</sup> Muong Yo 2;<sup>1</sup> Phong Saly 5;<sup>1</sup> Xieng Kuang 1.<sup>1</sup> Tonkin: Backan 8;<sup>1</sup> Bao Ha 7;<sup>1</sup> Chapa 2,<sup>1</sup> 21;<sup>2</sup> Chora 1;<sup>1</sup> Isla de Table 1;<sup>1</sup> Langson 1;<sup>1</sup> Lieng San 1;<sup>1</sup> Muong Boum 1;<sup>1</sup> Muong Mo 5;<sup>1</sup> Nganson 3;<sup>1</sup> Pakha 3;<sup>2</sup> Tam Dao 7;<sup>1</sup> Thai Nien 4;<sup>1</sup> Ye Yen Sun 1.<sup>1</sup>

***Callosciurus erythraeus gordonii* Anderson. CORDON'S SQUIRREL.**

*Sciurus gordonii* Anderson, Proc. Zool. Soc. Lond., p. 140, 1871—Bhamo, Upper Burma.

K.-R.—Thirty-seven miles north of Bhamo 1.

This specimen, practically a topotype, agrees with a large series in the British Museum from "Salween Divide."

***Callosciurus erythraeus michianus* Robinson and Wroughton. YUNNAN SQUIRREL.**

*Sciurus castaneiventris michianus* Robinson and Wroughton, Jour. Fed. Malay States Mus., 4, p. 234, 1911—Mee Chee, Yunnan.

K.-R.—Likiang, Yunnan 1; Nui Kai (thirty miles north of Talifu) 1; Shangkuan (ten miles north of Talifu) 3.

In two of these, the gray midventral stripe is fully developed, in one it is slightly interrupted posteriorly, in another confined to the chest, and in still another it is wholly absent. There is also variation in the shade of ferruginous of the under parts. Other specimens examined from the Likiang region show similar variation and, although they are easily distinguishable from *gordonii* on the one hand and *gloveri* on the other, they seem to represent an intermediate stage between the two.

***Callosciurus erythraeus gloveri* Thomas. GLOVER ALLEN'S SQUIRREL.**

*Callosciurus erythraeus gloveri* Thomas, Jour. Bomb. Nat. Hist. Soc., 27, p. 502, 1921—Nagchuka, western Szechwan.

K.-R.—Baurong, Szechwan 4; Muli, Szechwan 5; Yungning, Yunnan 2.

This form seems nearest to *michianus*, with which it agrees in general pale color, but differs in the absence of the midventral stripe.

<sup>1</sup> Kelley-Roosevelts Expedition.

<sup>2</sup> Delacour and Lowe, 1929-30.

<sup>3</sup> Records, 1925-29.

In the more southern specimens the ears are noticeably ochraceous and contrasted, but in those from Baurong, taken in May, the ears are gray with only faint traces of ochraceous. This may be partly seasonal or it may represent the extreme of a development from the southern forms northward.

***Callosciurus erythraeus bonhotei* Robinson and Wroughton.**  
BONHOTE'S SQUIRREL.

*Sciurus castaneiventris bonhotei* Robinson and Wroughton, Jour. Fed. Malay States Mus., 4, p. 234, 1911—Chin Chien San, Szechwan.

K.-R.—Omei-Shan, Szechwan 1.

This is a large, dark-colored squirrel quite unlike *gloveri* and *nichianus* of western Szechwan and probably more nearly related to forms of southern and eastern China. Besides the type, there are in the British Museum two other examples from Chen Yen Say and Yuen Ching Hsien, both collected by M. P. Anderson.

***Callosciurus flavimanus* Geoffroy.**

*Sciurus flavimanus* Geoffroy, Mag. Zool., Classe I, Mamm., p. 1, 1832—Tourane, Annam.

REC. 1925-29.—Col des Nuages, A. 22; Huê, A. 1; Thua Lua, A. 2.

***Callosciurus flavimanus quantulus* Thomas.**

*Sciurus flavimanus quantulus* Thomas, Proc. Zool. Soc. Lond., p. 51, 1927—Xiang Kuang, Laos.

K.-R. Phouc Mon, Quangtri, A. 7.

REC. 1925-29. Ceia Tung, Quangtri, A. 3; Xiang Kuang, L. 7.

These agree closely with specimens from Col des Nuages regarded as typical *flavimanus* by Thomas (1927, p. 51). In most of them, however, the terminal inch of the tail is either wholly black or black with a few light-tipped hairs, although one has scarcely more black at the tip of the tail than laterally. In three there is evidence of a light hip-patch, in the others none. Two have the tails annulated with black and dull whitish, while the others are much more ochraceous. In some the "maroon" of the under parts extends to the chin and in others it does not. These are among the characters used by Thomas to distinguish no less than five races of this squirrel within a district scarcely more than three hundred miles in linear extent. It is, nevertheless, entirely possible that these all may be locally distinct, since notable cases of such differentiation among squirrels

are known elsewhere. On the other hand, seasonal variation in squirrels is considerable and dimorphism frequent. The supposed races are *quantulus* (Xieng Kuang, Laos), *pirata* (Napé, Laos), *dactylinus* (Dakto, Annam), and *contumar* (Kontoum, Annam). Typical *flavimanus* is represented by a large series from Col des Nuages, the others by a half dozen specimens, each series from a single locality. Our specimens apparently stand somewhat between *quantulus* and *pirata* and similar ones have been referred by Thomas to *quantulus*.

***Callosciurus flavimanus bolovens* subsp. nov.**

*Type* from Paksong, Boloven Plateau, Laos. No. 37,874 Field Museum of Natural History. Adult female. Collected January 24, 1932, by J. Delacour. Orig. No. 211.

*Diagnosis*.—Similar to *C. flavimanus*, but distal part (one-fourth to three-fourths) of tail self-colored ferruginous or cinnamon rufous without annulations; base of tail with hairs light at base and with only two or, at most, three, dark annulations; sides of face and top of head largely ochraceous tawny and entire pelage more extensively rufescent than in *flavimanus* and related subspecies; hands and feet nearly as richly colored as the under parts and in some contrast to the front sides of the arms which are paler; lower legs in some cases suffused with tawny on outer sides; under parts practically as in *flavimanus*; a slight hip-patch in some specimens.

*Measurements*.—Type: total length 452; tail 208; hind foot 55.

*Remarks*.—This form is represented by twenty-four specimens in which there is some variation but in which the important characters are well maintained. Although it is probable that too many names already have been applied to the *flavimanus* group, there seems no possible disposition of these specimens except as representatives of an undescribed form. They differ from all the previously named ones more than any of them do from each other and their remarkable tails, largely self-colored, even suggest those of the *ferrugineus* group. The condition of the tails in most cases is slightly worn, indicating a pelage of long standing, and it is not unlikely that such a pelage might be succeeded by one in which at least a few annulations would be carried to the tip. Nothing closely resembling them, however, has been seen in the other forms.

*Specimens examined*.—Bantion, L. 1; Pakhout, L. 1; Paksong, L. 2; Thateng, L. 20.

***Callosciurus flavimanus dactylinus* Thomas.**

*Callosciurus flavimanus dactylinus* Thomas, Proc. Zool. Soc. Lond., p. 52, 1927—Dakto, Annam.

REC. 1925-29.—Dakto, A. 5.

***Callosciurus flavimanus contumax* Thomas.**

*Callosciurus flavimanus contumax* Thomas, Proc. Zool. Soc. Lond., p. 52, 1927—Kontoum, Annam.

REC. 1925-29.—Kontoum, A. 5.

***Callosciurus flavimanus pirata* Thomas.**

*Callosciurus flavimanus pirata* Thomas, Proc. Zool. Soc. Lond., p. 836, 1929—Napé, Laos.

REC. 1925-29.—Huê, A. 1; Napé, L. 11.

***Callosciurus imitator* Thomas.**

*Callosciurus imitator* Thomas, Proc. Zool. Soc. Lond., p. 502, 1905—Thai Nien, Tonkin.

K.-R.—Lieng San, T. 6; Muong Boum, T. 11; Muong Moun, T. 4; Muong Yo, L. 16; Nam Neu, south of Lai Chau, T. 1; Nong Lum, T. 1; Phong Saly, L. 3; Vientiane, L. 1.

D. & L. 1929-30.—Chapa, T. 17; Hoi Xuan, A. 2; Pakha, T. 3. WULSIN 1924.—Lai Chau, T. 3; Muong Khoua, L. 1.

REC. 1925-29.—Muong Sen, A. 2; Napé, L. 2; Phuqui, A. 15; Thai Nien, T. 2; Xieng Kuang, L. 1.

This plain-colored squirrel evidently is very common throughout northern Laos and western Tonkin, since it was taken in much larger numbers than any other species. There is but little variation in color shown and no distinctions can be made between northern and southern specimens. The single example from Vientiane, taken July 3, indicates that the color of the under parts may be considerably lighter at that season than in winter.

***Callosciurus griseimanus* Milne-Edwards. GRAY-HANDED SQUIRREL.**

*Sciurus griseimanus* Milne-Edwards, Rev. Mag. Zool., (2), 19, p. 195, June, 1867—Saigon, Cochin China.

*Macrozus leucopus* Gray, Ann. Mag. Nat. Hist., (3), 20, p. 282, Oct., 1867—Cambodia.

*Sciurus leucopus fumigatus* Bonhote, Abstr. Proc. Zool. Soc. Lond., p. 2, Jan. 22, 1907—Ninh Hoa, Annam.

*Sciurus vassali* Bonhote, Proc. Zool. Soc. Lond., p. 9, 1907—substitute for *fumigatus*, preoccupied.

*Callosciurus leucopus* Thomas, Proc. Zool. Soc. Lond., p. 147, 1928.

D. & L. 1929-30.—Ninh Hoa, A. 3; Phanrang, A. 3.

REC. 1925 29.—An Binh, C.C. 4; Djiring, A. 21; Tay Ninh, C.C. 9.

Although Bonhote regarded *griseimanus* and *leucopus* as distinct species and recognized two races of *leucopus*, present evidence seems to indicate that no more than one variable form is concerned. Thomas (l.c.) has noted great variability in an extensive series from Djiring, Annam, on the basis of which he discredits *vassali*, but he does not mention *griseimanus*. In the Delacour and Lowe collection of 1930 are six specimens obtained by Jabouille, three from Ninh Hoa and three from Phanrang, both localities in the same general region as Djiring. Those from Ninh Hoa, which is the type locality of *vassali*, show all the characters of *griseimanus*, while those from Phanrang, taken at another season, represent the other extreme of coloration supposed to characterize *leucopus*. The Ninh Hoa specimens, taken in September, are darker and have the under parts rich ferruginous in great contrast to the upper parts. Those from Phanrang, taken in July, are generally paler and the under parts are merely pale buffy blending on the sides with the upper parts. Although these differences are very pronounced, it seems highly probable that they are due mainly to a seasonal change and the variation between the extremes which has been recorded previously may be accountable as stages from one to the other.

The names *griseimanus* and *leucopus* were published in the same year, the former apparently having priority of a few months.

***Callosciurus ferrugineus williamsoni* Robinson and Kloss.  
WILLIAMSON'S SQUIRREL.**

*Callosciurus ferrugineus williamsoni* Robinson and Kloss, Ann. Mag. Nat. Hist., (9), 9, p. 90, Jan., 1922—Khet Don Heing, Paklai loop, north bank Mekong River, Laos.

K.-R.—Vientiane, L. 7.

DEL. 1931-32.—Pakse, L. 5.

The small series of this handsome squirrel from Vientiane is quite uniform in coloration and, since the locality is not very far from that of the original series, is quite typical in all respects. Direct comparison with the type, now in the British Museum, finds agreement as to color, although the type was taken in January and

the Vientiane specimens in July. The type merely has somewhat heavier pelage.

This squirrel furnishes an instance of the rather unusual coloration (at least in certain pelages) in which the under parts are darker and more deeply colored than the upper parts. Its nearest ally is doubtless the Siamese *menamicus* from which it differs in generally brighter color above and in the sharp demarcation of upper and lower parts.

The specimens from Pakse in general are more deeply colored than those from farther north and the tails are no lighter at the tips than elsewhere. It is probable, however, that such differences are due largely or wholly to season. Apparently the form has quite an extensive north and south range along the east bank of the Mekong. The occurrence of *annellatus* on the west side of the river and *williamsoni* on the east side practically opposite indicates that there is no connection between them at this point.

### ***Callosciurus ferrugineus splendens* Gray.**

*Sciurus splendens* Gray, Proc. Zool. Soc. Lond., p. 137, 1861—S. Cambodia (Thomas, 1929).

REC. 1925-29.—Bokor, C. 10; Kampot, C. 1.

### ***Callosciurus ferrugineus cinnamomeus* Temminck.**

*Sciurus cinnamomeus* Temminck, Esq. Zool. Guin., p. 250, 1853—Siem Reap, Cambodia (Thomas, 1929).

REC. 1925-29.—Siem Reap, C. 6.

### ***Callosciurus ferrugineus annellatus* Thomas.**

*Callosciurus ferrugineus annellatus* Thomas, Proc. Zool. Soc. Lond., p. 839, 1929—Angkor, Cambodia.

D. & L. 1929-30.—Cambodia 2.

DEL. 1931-32.—Bassac, L. (west bank of Mekong) 2.

Two specimens of this oddly marked squirrel are among those obtained by the botanist H. Poilane, for Delacour and Lowe in 1930. Their exact locality is queried, but some evidence seems to indicate that they came from Kratie, Cambodia. The body color, which Thomas gives merely as "deep rich rufous" is very close to the Claret Brown of Ridgway, and the tail is Maroon, with concealed apical black.

The two fine examples from Bassac have the sides of the head, chin, arms, and the fore and hind feet much darkened, almost



blackish. It is possible that they should be distinguished nomenclaturally, but it is perhaps more probable that they are merely gradients between *annellatus* and one of the numerous named forms of the variable group to which they belong.

***Callosciurus finlaysoni* subsp.**

An imperfect skin without skull from Kratie, Cambodia, is in the Delacour and Lowe collection. Another from "Na Kai," Indo-China, is in the material collected by F. R. Wulsin for the United States National Museum. This is blackish on the back and the base of the tail, but in the absence of comparative material no attempt at exact determination has been made.

***Callosciurus* sp.**

A squirrel from Luang Prabang, Laos, obtained by F. R. Wulsin, may represent an undescribed form allied to *caniceps* and *pygerythrus*, but material is insufficient to ascertain its proper position, especially in view of the great seasonal changes and the high variability known to characterize the group to which it belongs. The single specimen has the under parts and the tail almost the same bright shade as the back, the intervening sides being gray.

***Menetes berdmorei mouhoti* Gray. BERDMORE'S STRIPED SQUIRREL.**

*Sciurus mouhotii* Gray, Proc. Zool. Soc. Lond., p. 137, 1867—Cambodia.

*Menetes berdmorei moerescens* Thomas, Jour. Bomb. Nat. Hist. Soc., 23, p. 24, 1914—Bali, near Nhatrang, Annam.

D. & L. 1929-30.—Hon Quan, C.C. 1; Lao Bao, A. 1; Ninh Hoa, Nhatrang, A. 1.

REC. 1925-29.—An Binh, C.C. 1; Angkor, C. 1; Dakto, A. 3; Kontoum, A. 7; Tay Ninh, C.C. 2.

The medium-sized striped squirrels represented by the generic name *Menetes* have a rather limited range from southeastern Burma through Tenasserim and Siam to southern Annam. Within this region Thomas has attempted to distinguish no less than five forms (*berdmorei*, *consularis*, *decoratus*, *moerescens*, and *mouhoti*). To these Gyldenstolpe has added a sixth (*koratensis*) and Kloss, perhaps more justifiably, has given names to forms from islands lying near the coast of Siam (*umbrosus* and *rufescens*).

A somewhat cursory review of the types and other specimens of *Menetes* in the British Museum brings the conviction that perhaps

no more than half the names for mainland forms will ultimately be recognized. Variation due to season is very great, as in *Tamias*, and various other squirrels and, many localities being represented only by single badly prepared specimens, conclusions in which fine distinctions take part seem very uncertain.

The specimen in hand from Ninh Hoa is practically a topotype of *moerescens*, but its skull is smaller than that of the type and seems to indicate that *moerescens* at least should be a synonym of *monholi* whether or not this last be separated from *herdmorei*.

It is probable that the last word has not yet been said as to the generic position of these squirrels. Their relation to East Indian species may need investigation and there is also interest in the possibility that they may be allied to *Sciurotamias* through the monotypic *Rupestes* which both externally and cranially presents a combination of the characters of *Menetes* and *Sciurotamias*.

#### **Sciurotamias davidanus** Milne-Edwards. PÈRE DAVID'S SQUIRREL.

*Sciurus davidanus* Milne-Edwards, Rev. Mag. Zool., (2), 19, p. 196, 1867—mountains near Peking, China.

K.-R.—Ko-chia-ho-pa, Szechwan 1; Trash-cho-tin, Szechwan 1.

These localities are northeast of Tatsienlu and but a short distance almost directly west of Mouping. The specimens seem quite typical of *davidanus* which has been found mainly farther east and northeast. Just how they are connected to the eastward is not clear but perhaps it is through the province of Hupeh since darker forms occupy the region immediately northward.

#### **Sciurotamias davidanus consobrinus** Milne-Edwards.

*Sciurus consobrinus* Milne-Edwards, Rech. Mamm., pp. 304-305, 1868-74—Mouping, Szechwan.

K. R.—Tupakeo, Szechwan 1.

A specimen from the region immediately northwest of Mouping may be regarded as practically topotypical of *consobrinus*. It is considerably darker and more richly colored than any of a series of *owstoni* from Shensi. Its feet are blackish and, so far as can be judged by the description, it is practically identical with *S. d. thayeri* G. M. Allen from Washan, Szechwan.

#### **Dremomys pernyi griselda** Thomas. LONG-SNOURED SQUIRREL.

*Dremomys pernyi griselda* Thomas, Ann. Mag. Nat. Hist., (8), 17, p. 392, 1916—Nagchuka, Szechwan.

*Dremomys pernyi lichiensis* Thomas, Ann. Mag. Nat. Hist., (9), 10, p. 403, 1922—Likiang Range, Yunnan.

K.-R.—Szechwan: Baurong, Yalung River, lat. 29° N. 1; Chi-il, about lat. 29° 20' N. 1; Mi Lola, between Yungning and Muli, about lat. 28° 10' N. 5; Tiyu (Gomba), southwest of Baurong 1; 25 miles north of Tatsienlu 1; Wushi, northeast of Baurong 4; Yulongkong, near Tatsienlu 1. Yunnan: Likiang 3; Manyuh Camp, about 50 miles north of Likiang 1; Nguluko, about 20 miles north of Likiang 1; Yungning, near Szechwan boundary 4; watershed south of Yungning 1.

Squirrels of the genus *Dremomys* collected by Herbert Stevens cover a range of dates from February to August, and various localities from Likiang in Yunnan to the region of Tatsienlu in Szechwan. These are supplemented in Field Museum by specimens from the Likiang region received from the Third Asiatic Expedition and by two important topotypes of *lichiensis* from the original series, received through exchange with the British Museum.

Examination of this material finds little justification for the recognition of *lichiensis* as distinct from *griselda*. The variation in color is slight and not correlated with geography. The species lives at very high altitudes where conditions may be assumed to be relatively uniform and it is plain that the larger rivers have not been barriers to its distribution. Probably there is not an elevated area in all of southwestern China in which it could not be found. If typical *pernyi* be recognized from southwestern Yunnan, as defined by Thomas, and *flavior* from southeastern Yunnan, there is scarcely room for *lichiensis*. Even if the slight characters mentioned for it could be substantiated, they would best be explained as simple evidence of gradation between *griselda* and the more southern forms.

### ***Dremomys rufigenis ornatus* Thomas.**

*Dremomys rufigenis ornatus* Thomas, Jour. Bomb. Nat. Hist. Soc., 23, p. 26, 1914—Mongtze, Yunnan, China.

K.-R.—Lieng San, T. 1; Muong Mo, T. 3; Muong Moun, T. 1; Muong Yo, L. 3; Phong Saly, L. 1.

D. & L. 1929-30.—Chapa, T. 19; Pakha, T. 1.

REC. 1925-29.—Backan, T. 3; Bao Ha, T. 1; Ngai Tio, T. 1; Tam Dao, T. 8.

In this series there are two types of coloration, one in which the under parts are mainly whitish and another in which they are wholly pale ochraceous, the only white being on the inside of the arms. Both

types may occur at one locality. Although ochraceous under parts have not been noticed heretofore in the *rufigenis* series, there is little doubt that these specimens should be referred to *ornatus*. In fact, the distinction of *ornatus* from typical *rufigenis* may be strengthened by this tendency to ochraceous under parts which is more than likely to be found in southern Yunnan as well as in Tonkin and Laos. The type of *ornatus* can be matched easily among Tonkin specimens so far as color is concerned. It has the chin, throat, and even the breast pale ochraceous, the belly and the inside of the legs whitish. The upper parts are uniformly colored without any obvious increase in rufescent about the rump and thighs. The usual light hip-patch is present. The ear-patches are whitish at the base with ochraceous tips to the hairs. This is the general style which prevails throughout northern Laos and Tonkin, whereas from more southern localities there is more contrast between the color of the body and that of the hind legs. Some of this is doubtless due to season, but it is probable that a southern race (*fuscus*) can be recognized. Specimens taken in November are more olivaceous and uniform in color than those taken in March and what they might be in July and August is not known.

The skulls of the Tonkin specimens are in general smaller than the skull of the type of *ornatus*, but a competent study of skulls is not possible with present material.

### ***Dremomys rufigenis fuscus* Bonhote.**

*Funambulus rufigenis fuscus* Bonhote, Abstr. Proc. Zool. Soc. Lond., p. 2, Jan., 1907 - Bali, Annam.

REC. 1925-29. - Col des Nuages, A. 11; Dakto, A. 1; Dalat, A. 1; Djiring, A. 1; Kontoum, A. 1; Napé, L. 3; Thua Lua, A. 1; Xieng Kuang, L. 13.

DEL. 1931 32. - Thateng (1,000 feet above), L. 1.

In his several papers on Indo-Chinese mammals, Thomas has been chary about the reference of individual specimens of *Dremomys* to definite subspecies. It is clearly a difficult group and it is probable that the number of names now extant is more than sufficient. Although Thomas has continued to do so, there seems little reason for withholding the name *fuscus* from the form of southern and central Annam. Specimens from Col des Nuages are, for the most part, essentially the same as the type series of *fuscus*. At best these could be no more than intermediates between *fuscus* and the supposed form called *laomache* (Thomas, Ann. Mag. Nat. Hist., (9), 7, p. 182,

1921) from the vicinity of Pak Hin Bun, Laos. That *laomache* is itself only a slight gradient between *fuscus* and *ornatus* also is extremely probable. Specimens from Kontoum, Annam, are closely similar to the type of *laomache* and others from Xieng Kuang are but slightly different, while from Napé, Laos, but a short distance away, are specimens agreeing with *fuscus* from southern Annam. The single specimen from the Boloven Plateau perhaps should represent *laomache* on geographic grounds, but it shows no distinguishing characters.

***Dremomys pyrrhomerus gularis* sp. nov.**

*Type* from Mount Fan Si Pan, near Chapa, Tonkin. Altitude 8,000-10,000 feet. No. 32.4.19.5. British Museum. Adult male. Collected Dec. 3, 1929, by J. Delacour and W. Lowe. Orig. No. 1,551.

*Diagnosis.* Similar to *D. pyrrhomerus* and *D. rufigenis* but chin and throat and inner sides of hind legs rich Ochraceous Tawny in abrupt contrast to other under parts; flank patch obsolescent and reduced to a narrow line scarcely more evident than in *rufigenis*; cheeks, nose and forehead less tawny than in *rufigenis*, nearly or quite as in *pyrrhomerus*.

*Color.*—Upper parts (November and December specimens) grizzled brownish to olivaceous (Prouts Brown to Olive Brown), about as in *rufigenis*, more saturate than in *pyrrhomerus*; a short blackish line usually evident on middle of back; top of head, nose and sides of face from slightly below eyes like back; lower cheeks and base of whiskers ochraceous tawny continuous with chin and throat; light patches behind ears whitish basally, Ochraceous Buff to Cinnamon apically; flank-patch scarcely evident except as a slight extension of the color of the inner sides of the hind legs; hands and feet grizzled blackish usually with a tinge of ochraceous; tail slightly paler or practically as in *rufigenis* and *pyrrhomerus*, the under side mainly bright Ochraceous Tawny narrowly bordered by gray-tipped black; upper side of tail coarsely grizzled, the hairs with five annulations including a whitish tip; under parts divided into three sharply contrasted color areas; chin, throat, fore-breast, and a narrow line on inner sides of arms Ochraceous Tawny, the hairs with narrow dark bases; base of tail, anal region, and entire inner sides of thighs also Ochraceous Tawny; midventral region and a short extension on hind side of arms whitish gray, the hairs broadly dark basally and narrowly tipped with creamy white.

*Skull.*—Size rather large with a broad full braincase; rostrum averaging shorter and heavier than in *pyrrhomerus*; supraorbital border with a well-marked notch.

*Measurements.*—Average of ten adults measured by the collector: head and body 216; tail 168; hind foot (s.u.) 45. Skull of type: greatest length 57.6; condylo-basal length 50.2; zygomatic width 31; interorbital width 16.7; median length of nasals 17.9; least width of nasals 4; diastema 12.8; upper toothrow 10.1.

*Remarks.*—This is a very distinct form, perhaps a separate species, but various general resemblances to *pyrrhomerus* and the fact that it occurs at high elevations within the area occupied by *rufigenis* lead to the inference that it is most probably a southern representative of *pyrrhomerus*. To some extent it combines certain of the characters of *rufigenis* and *pyrrhomerus* since it resembles *rufigenis* in lacking the prominent flank-patch but is more like *pyrrhomerus* in the color of the head. It differs strikingly from both in its brightly colored throat and hind legs. The slight tendency to a dark dorsal line shown in some specimens of *pyrrhomerus* is repeated in *gularis*. In cranial characters, also, the resemblance between the two is obviously close. When more material is obtained from the southern provinces of China, therefore, it is not unlikely that gradations will be found.

A large series of thirty-eight specimens of this handsome new squirrel was obtained by Delacour and Lowe during their long stay at Chapa, Tonkin. Some of them were labeled as coming from elevations no higher than 5,000 feet but since they were derived from native hunters there may be doubt as to the exact height at which individual specimens were taken. A considerable number are known definitely to come from Mount Fan Si Pan and at the highest altitudes, from 8,000 feet upward, this was the only species of *Dremomys* obtained. Here it was found in company with *Tamiops olivaceus*, microtines, and other species having affinities with northern forms. Most of the specimens are in slightly worn but rather thick pelage in which the median under parts have the basal color of the hairs somewhat exposed. For this reason the collectors, in their field catalogues, distinguished the species as the "blue-bellied squirrel."

***Tamiops swinhoi* Milne-Edwards. SWINHOE'S STRIPED SQUIRREL.**

*Sciurus marcellandii* var. *swinhoi* Milne-Edwards, Rech. Mamm., p. 308, 1868-74—Mouping, Szechwan.

K.-R.—Lian-feng-kang, near Omei-Shan, Szechwan 1.

This is fully typical and has been compared with a specimen from Mouping formerly in the Paris Museum but now in the British. Other Szechwan examples seen are from Yeng-ling-pa and Hca-keatun, as well as a further fine specimen from Omei-Shan collected by M. P. Anderson during the Duke of Bedford's exploration of eastern Asia.

The specimen in hand was taken Oct. 8, 1929, by Herbert Stevens and is in very handsome pelage, with five black stripes, two outer light stripes of dark cinnamon-buff, measuring about 10 mm. in width, and two inner light stripes of cinnamon-brown.

There seems no doubt that *swinhoei* should stand as a species distinct from the "*macclellandi*" and probably also from the "*maritimus*" series. Its large size sets it off from most of these, but, as elsewhere noted, it probably intergrades with *clarkei* and through this possibly also with *monticola* and *olivaceus*. Its skull is characterized by unusually large audital bullae which are only equaled by those of *T. vestitus* of the Peking region. Therefore a gradation between *vestitus* and *swinhoei* may be looked for in future collections.

### **Tamias swinhoei clarkei** Thomas.

*Tamias clarkei* Thomas, Ann. Mag. Nat. Hist., (9), 5, p. 304, March, 1920—Yangtze Valley, northern Yunnan (lat. 27° 20' N.; long. 101° E.).

K.-R.—Kulu, upper Yalung River, western Szechwan 1; Wushi, southwest of Tatsienlu, Szechwan 1.

These specimens have considerable interest as probably illustrating the "left-over" winter pelage of *T. s. clarkei* and indicating its subspecific relationship to *swinhoei*. They were taken in April and May and are in long, shaggy, partly worn pelage, quite different from the smooth, short coats of the type and other available specimens of *clarkei*. On the top and sides of the head, however, they are much paler than in *swinhoei* and closely similar to *clarkei*. The outer light stripes are fairly marked but suffused with fulvous and they are shorter and broader than might be expected in *clarkei*. The tails are broader and more ochraceous than in *clarkei*. On the whole they seem to combine characters of *swinhoei* and *clarkei*, but probably are much nearer the latter. Their skulls are slightly smaller and the audital bullae are quite markedly smaller than in *swinhoei*. This difference in the bullae seems almost sufficient to be of specific importance, but available skulls of typical *swinhoei* are few in number and the probability of complete intergradation is very strong.

***Tamiodontomys macclellandi rodolphe* Milne-Edwards.**

*Sciurus (Tamias) Rodolphi* Milne-Edwards, Rev. Mag. Zool., (2), 19, p. 227, 1867—Cochin China near Saigon.

A single specimen of this squirrel is among the collections obtained by Delacour and Lowe from the botanist Poilane. Its exact locality is not stated. The type, collected by Rodolphe Germain, was said to be from "Cochinchine" and doubtless came from the region of Saigon. The original description mentions the color of the under parts "un beau jaune orange" which characterizes the form. It is well represented in the British Museum by specimens from several localities in Cochin China, including An Binh, Tay Ninh, Trang Bom (twenty-five miles east of Saigon), and Saigon. There are also five specimens from Djiring, Annam, and one from Bali, near Nhatrang.

Specimens from Angkor and Sambor, Cambodia, referred by Thomas (1929, p. 840) to *rodolphe* seem to agree more nearly with subspecies *liantis* (syn. *lylei*) which is very close to *rodolphe* on the one hand and to *kongensis* on the other. The type of *T. m. dolphoides* Kloss (Jour. Nat. Hist. Soc. Siam, 4, p. 101, 1921) has not been examined, but its locality, in western Cambodia, indicates its close affinity. Assuming continuous distribution, the transition from *rodolphe* to *barbei* evidently takes place via *dolphoides*, *liantis*, and *kongensis*. Whether or not so many names are justified in such a limited area may not be demonstrable at present, but, as further material accumulates, consideration will be needed as to the possibility that one or more of them should be regarded merely as "intermediate."

***Tamiodontomys macclellandi inconstans* Thomas.**

*Tamiodontomys inconstans* Thomas, Ann. Mag. Nat. Hist., (9), 5, p. 306, March, 1920—Mongtze?, Yunnan.

D. & L. 1929-30.—Pakha, T. 1.

REC. 1925-29.—Ba Be, T. 3; Bao Ha, T. 9; Thai Nien, T. 4.

All the specimens thus far obtained of this rare form are from the valley of the "Fleuve Rouge" in a very limited area in southern Yunnan and northwestern Tonkin. Only the dull, winter pelage is represented, but the presence of four light stripes as well as the size and cranial characters leaves no doubt of the close relationship to *macclellandi*. All the stripes are less contrasted with each other than in other forms and the inner pair of light stripes is decidedly



less distinct than the outer. Interruption of the subocular stripe at the shoulders is less than in *dolphoides* and in many specimens there is practical continuity. In the summer pelage it would not be surprising to find it as unbroken and well marked as in *barbei*. The under parts are deeper-colored than in Annamese *dolphoides* and practically the same as in *barbei*.

The connection of this form with other members of the *maccllelandi* series is possible either through *barbei* or *dolphoides* or perhaps through both. In the stretch of coast between Hanoi and Huế there is room for gradation into *dolphoides*, but, although some collecting has been done in this region, nothing of the kind has yet been found. Intergradation with *barbei* also is to be looked for in the region between Tonkin and Upper Burma, for specimens apparently indistinguishable from *barbei* have been recorded from Mengting, Yunnan, in this latitude by G. M. Allen (Am. Mus. Novit., No. 163, p. 7, 1925).

The occurrence of *inconstans* and *hainanus* at the same localities in Tonkin furnishes further evidence of the specific distinctness of the *maccllelandi* and *maritimus* series.

### **Tamiops maccllelandi dolphoides Kloss.**

*Tamiops maccllelandi dolphoides* Kloss, Jour. Nat. Hist. Soc. Siam, 4, No. 2, p. 101, March, 1921—Kompong Som Bon, near Sre Umbel, Cambodia.

K.-R.—Phouc Mon, Quangtri, A. 3.

D. & L. 1929-30.—Ninh Hoa, north of Nhatrang, A. 1.

DEL. 1931-32.—Pakse, L. 2; Paksong, L. 2; Paleng, L. 2; Phukong Ntoul, L. 3; Thateng, L. 24 (12 alc.).

REC. 1925 29.<sup>1</sup>—Col des Nuages, A. 7; Dakto, A. 10; Kontoum, A. 7; Napé, L. 1.

The small striped squirrels of east-central Annam differ from *rodolphei* in having the upper parts darker, more olivaceous, and the under parts Ochraceous Buff with a yellowish tinge instead of Orange Rufous. Possibly they should be segregated under a new name, but since *dolphoides* is described as having yellowish rather than orange rufous under parts, it seems best for the present to treat them under that name. Probably they will prove to be more differentiated from *rodolphei* than is *dolphoides* from its type locality, and it may be that we have here one of those unfortunate but unavoidable cases in which the type locality is near the periphery

<sup>1</sup> Recorded under the name *rodolphei*.

of the range of a definable form and the type is in a certain sense "not typical."

There is some indication, also, of tendency toward *T. m. inconstans* and, although *Tamiodips* of the *maccllelandi* series have not been taken in northern Annam and southern Tonkin in the area intervening between the ranges of *dolphoides* and *inconstans*, the possibility that they may occur there cannot as yet be excluded.

### ***Tamiodips maccllelandi kongensis* Bonhote.**

*Sciurus maccllelandi kongensis* Bonhote, Proc. Zool. Soc. Lond., p. 55, 1901—Raheng, Siam.

WULSIN 1924.—Vientiane, L. 5.

Five specimens taken in July at Vientiane are more grayish than *barbei* and may be referred provisionally to *kongensis*. A form (*laotum*) allied to *maritimus* also occurs at this locality which is thus shown to be in the area in which there is overlapping of the *maccllelandi* and *maritimus* series.

### ***Tamiodips maritimus hainanus* Allen.**

*Tamiodips maccllelandi hainanus* J. A. Allen, Bull. Am. Mus. Nat. Hist., 22, p. 476, Dec., 1906—Lei-Mui-Mon, island of Hainan, China.

*Tamiodips maccllelandi riudoni* J. A. Allen, l.c., p. 477—Riudon, island of Hainan, China.

K.-R. Ba Nam Cai, T. 1; Boun Tai, L. 1; Chapa, T. 5; Lai Chau, T. 2; Lao Fou Chai, L. 1; Lieng San, T. 5; Muong Boum, T. 6; Muong Mo, T. 7; Muong Moun, T. 5; Muong Yo, L. 5; Nong Lum, T. 3; Pa Ham, T. 2; Phong Saly, L. 6; Phong Tho, T. 1.

D. & L. 1929-30. Chapa, T. 10; Hoi Xuan, A. 8; Lung Lunh, A. 1; Pakha, T. 2.

A study of this material, all from one general region and representing numerous localities and dates, leads to much uncertainty as to the validity of various color-characters supposed to differentiate closely allied forms within the group. A selected number of specimens was taken to London and there compared with the series in the British Museum, including the types of *maritimus*, *monticola*, *laotum*, and *moi*. This series includes specimens from Xieng Kuang and Napé, Laos, which Thomas has referred to *laotum*, as well as others from Backan and Chora, Tonkin, which the same author regarded as inseparable from *maritimus*. In London the conclusion was formed that all the specimens from Tonkin and Laos should

be referred to one form with the qualification that those from more southern and western localities averaged paler than those from farther north and east. Subsequent study in Field Museum, which has some twenty specimens from the island of Hainan, brought up the question of the supposed distinction of an insular form. This has forced the opinion that present material does not justify any separation in this case. If there be any distinction it must be one of very slight average characters which cannot as yet be demonstrated. Excluding specimens from Napé, Laos, and others from the same region, which are grading toward *laotum*, makes this conclusion the more evident. If it be assumed that the same variations and seasonal changes are found on the island as on the mainland, there is no basis for separation. That two distinct species occur on the island is highly improbable without some differences in size and cranial characters. Such differences do not appear in two topotypes of "*riudoni*," kindly loaned by the American Museum of Natural History, and although these differ in color from most other Hainan specimens, they can be matched easily by mainland specimens among which a greater range of seasonal variation is shown than in collections from Hainan thus far made. The specimens representing *riudoni* were taken by a Chinese collector and are discolored on the throat and chest, evidently by some preservative or other extraneous means. The remaining under parts are rather dark but not more so than in many specimens from various localities in Tonkin. Therefore, it must be concluded that evidence is as yet insufficient to demonstrate the distinction of *riudoni* from *hainanus*.

As noted by G. M. Allen (Am. Mus. Novit., No. 163, p. 7, 1925), *hainanus* is distinguished from *marilimus* by having a smaller, more slender foot. Measurements taken from dried skins of *marilimus* show a foot-length of 32-34, whereas those taken in the same way from *hainanus* are only 28-30. This difference in the size of the feet is borne out by the skulls, those of *marilimus* being decidedly larger than in *hainanus*. Therefore, although color characters are baffling and uncertain, the separation of *marilimus* and *hainanus* on the basis of size is quite simple.

Practically all the specimens now in museums were taken in what may be called the winter season. The dates range only from November to May, leaving the long period of not less than five months from June to October unrepresented. It is evident also that dates alone are not wholly reliable guides as to comparability of pelages. Thus Hainan specimens taken in December and January

are not in the same stage as those taken on the mainland at the same dates but correspond more closely to stages which are not reached on the mainland until a month or two later. In general, the winter pelage (December to March) in its extreme form is very dull, the outer light stripes are narrow and clouded, and the median dark line is not sharply contrasted; the entire under parts are usually washed heavily with fulvous. As this pelage wears, the stripes become more defined and contrasted and the median dark stripe, especially, may become quite black and conspicuous before the general pelage shows any obvious signs of wear. In Tonkin and Laos this relatively dull winter pelage becomes frayed and rough in April and May and is then succeeded by a complete new coat in which the under parts are much paler and the stripes are very distinct. A median and one pair of lateral black or blackish stripes are well defined and the lateral light stripes are broad and relatively clear. How long this pelage may be worn is unknown, but late fall specimens (November) often show a coat not greatly worn which is quite similar to it, and it is possible there may be an intervening pelage. At least these changes of pelage provide room for very wide differences in the color and markings of individual specimens and, without series that are strictly comparable, fine subspecific distinctions cannot be drawn. Under these conditions, multiplication of names only produces confusion.

***Tamias maritimus laotum* Robinson and Kloss.**

*Tamias macclullandi laotum* Robinson and Kloss, Ann. Mag. Nat. Hist., (9), 9, p. 92, 1922- Pak Hlin Bun, east bank Mekong River, Laos.

K.-R.--Vientiane, L. 1.

D. & L. 1929-30.- Locality unknown 2.

DEL. 1931-32. -Saravane, L. 1.

This form is well characterized by very pale color which reaches its extreme development in southern Laos. Specimens from central and northern Laos (Napé and Xieng Kuang), which were heretofore regarded as *laotum*, are approaching *hainanus*. Even the type of *laotum* is somewhat darker than more southern specimens, but its departure from *hainanus* in the direction of general paleness is sufficiently marked.

The specimen from Vientiane, taken July 2, is in full "summer" pelage in which three broad black dorsal stripes are sharply marked. The outer light stripes are very broad and distinct.

**Tamiods maritimus moi** Robinson and Kloss.

*Tamiods muchillandi moi* Robinson and Kloss, Ann. Mag. Nat. Hist., (9), 9, p. 92, Jan., 1922. Langbian Plateau, southern Annam.

D. & L. 1929-30. Dalat, Langbian Plateau, A. 1.

A single specimen taken by Jabouille is in the collection. It is in excellent condition and, although dated September 12, it seems to resemble most closely specimens of *hainanus* from Tonkin and Laos taken in March, April and May. It appears to be in the last stages of a renewed pelage in which traces of a previous, worn coat remain only on the sides. The stripes are well marked and the outer light ones are suffused with fulvous, especially in their posterior half, but this is not distinctive since the same character is found in many specimens of *hainanus*. The under parts are uniformly pale creamy, much paler than in the type of *laotum* but quite like other specimens taken at a different season.

On the basis of this specimen alone, it would be difficult to find any character by which to separate *moi* from northern specimens, especially those which stand in a position intermediate between *laotum* and *hainanus*. Until series in comparable pelages can be examined, the status of the form may remain in doubt. In the British Museum are six specimens from Djiring, Annam, representing *moi*, but they are in such condition that their color seems untrustworthy. All have deep, ruddy tones suspiciously like those so often acquired when fresh specimens are temporarily immersed in liquid preservative before skinning. The type of *moi* and one apparently normal specimen from Djiring have a certain suggestion of this ruddiness, but altogether the material is much too scanty for reliable conclusions.

**Tamiods monticolus olivaceus** subsp. nov.

*Type* from Lo Qui Ho, Mount Fan Si Pan, near Chapa, Tonkin. Altitude 8,000-10,000 feet. No. 32.4.19.6. British Museum. Adult male. Collected Nov. 20, 1929, by J. Delacour and W. Lowe. Orig. No. 1,248.

*Diagnosis*.—Similar in size and general characters to *T. monticola* and *T. m. forresti*, but general color dark olivaceous rather than brownish, grayish or buffy; under parts Olive Ocher instead of Cinnamon-Buff; stripes varying according to pelage from a condition showing only one unclouded median stripe to that in which there is a median and four lateral black stripes.

*Color.*—General color dark but strongly olivaceous; markings as usual, with the subocular stripe discontinued at the shoulder; in dull (winter) pelage there is a short and narrow median black stripe bordered on either side by broader light stripes concolor with the general body color which is nearly Buffy Olive or Light Brownish Olive finely stippled with blackish; following these is the pair of principal dark stripes which are mainly brownish (Dresden Brown) with faint indications of underlying black; the principal lateral stripes are well-defined buffy slightly clouded and varying from Cream Buff to Olive Ocher; under parts Deep Colonial Buff to Olive Ocher. In a later pelage, probably produced by simple wearing away of the tips of the hairs, the entire coat is darker throughout and all the dark stripes have become pure black, including short ones below the outer lateral light stripes and making five black stripes in all; the submedian light stripes are clearer and more whitish than in the other pelage; the tail is mixed Tawny Olive and black, much darker than in *forresti* and slightly darker than in *monticolus*.

*Skull.*—General shape elongate with the rostrum produced and the anterior zygoma root sloping rather than “squared”; slightly smaller than in *monticolus*, about as in *forresti*; audital bullae rather small.

*Measurements.*—Type, measured by collector: head and body 119; tail 105; hind foot (s.u.) 27. Skull of type: greatest length 37.1; condylo-basal length 31.9; zygomatic width 20.7; least interorbital width 12.2; width of braincase 17.8; length of nasals 10.5; palate from henselion 14.9; greatest diameter of audital bulla 6.7; upper toothrow 6.5.

*Remarks.* Seventeen specimens of this well-marked form were obtained by Delacour and Lowe in the Fan Si Pan highlands near Chapa. Here it was associated with *Dremomys p. gularis*, *Eothenomys*, and other mammals of wholly northern affinities. Its distinction from *T. hainanus*, which occurs on the same mountains at lower levels, is obvious. A third species (*inconstans*) is found also in the same region, apparently on still lower ground or perhaps merely in a different ecological niche.

Although all the specimens were taken within a very brief period (Nov. 19-Dec. 7), they present two phases of pelage, one in which the lateral dark stripes are clear and contrasting, and another in which they are heavily overcast with brownish or olivaceous. Which

of these conditions precedes the other is difficult to determine, but examination of other material seems to indicate that the dull pelage is that of full midwinter and is not only followed but also preceded by a condition in which the stripes are more clearly defined. The possession of both these phases in the present series makes comparison with *monticolus* and *forresli* simple and certain.

The discovery of this form in the highlands of Tonkin in close proximity to two others (*hainanus* and *inconstans*) very distinct from it and from each other furnishes clear evidence that at least in this region the genus *Tamiops* includes three distinct species. That these might be local representatives of three widespread species, each with various geographic races, was a natural assumption and, in attempting to test it, all the described forms of the genus have been examined. A thorough revision of the group was not possible and it is plain that material is not yet sufficient for wholly satisfactory conclusions, but all specimens have been reviewed in the British Museum and Field Museum, together with certain others from the United States National Museum and the American Museum of Natural History.

Since various names are yet represented only by single specimens and since even others of which specimens are fairly numerous do not present more than one phase of pelage, it is too early for a clean-cut and positive analysis of the group. It is evident, however, that previous ideas of relationships need considerable revision and a general discussion of both certainties and probabilities can do no harm. Apparently cranial characters have had little attention in this group and careful consideration of them is often of much assistance in cases where the baffling pelages do not furnish satisfactory clues to affinities or distinctions. The state of knowledge of *Tamiops* is somewhat comparable to that of the American genus *Eutamias* some thirty years ago before pelage changes had been completely worked out. In not a single case, among all the numerous described forms, does material exist showing the progress of the pelages throughout the year.

For purposes of discussion the genus may be divided into two principal groups as follows:

*Tamiops swinhoei* group.—This group is northern in distribution and is characterized mainly by large size and, with few exceptions, by the interruption of the subocular stripe at the shoulders. Present indications are that it includes at least two and perhaps three distinct species (*swinhoei*, *monticolus* and *maritimus*), but the possibility of

the <sup>1</sup>inosculation of all three cannot positively be eliminated. Names in this group which seem entitled to some sort of recognition are:

- Tamias swinhoei* Milne-Edwards, Mouping, Szechwan.
- clarkei* Thomas, upper Yangtze, Yunnan.
- vestitus* Miller, Chihli Province, China.
- monticolus* Bonhote, Chin Feng Ling, Fukien.
- olivaceus* Osgood, mountains near Chapa, Tonkin.
- spencei* Thomas, Kachin Province, Burma.
- forresti* Thomas, Likiang Mountains, Yunnan.
- russeolus* Jacobi, Atentze, Thibet.
- maritimus* Bonhote, Foochow, Fukien.
- formosanus* Bonhote, Formosa.
- hainanus* J. A. Allen, Hainan, China.
- laotum* Robinson and Kloss, Pak Hin Bun, Laos.
- moi* Robinson and Kloss, Langbian, Annam.

Beginning with typical *swinhoei*, it is found that color gradations exist connecting it with *clarkei* and that cranial characters (large audital bullae) show it to be very closely allied to *vestitus*. These three then offer strong probability that they are geographic races of one species. Next is a series including *monticolus*, *olivaceus*, *spencei*, *forresti*, and *russeolus* which are approximately the same in size and cranial characters and differ from each other mainly in shades of color. There can be little doubt, therefore, that they are intergrading subspecies. Adequate material representing *spencei* and *russeolus* has not been seen, but their inclusion in the series seems well justified. Three specimens from Mucheng, Yunnan, referred by G. M. Allen (Am. Mus. Novit., No. 163, p. 5, 1925) to *swinhoei* seem like *spencei* as described and, although differing slightly from *monticolus*, they are more like that form than *forresti* and *olivaceus* which are geographically nearer. The relationship of the members of this series to *clarkei* is uncertain. None of them quite equals it in size, but some are closely similar in color, and all have skulls much as in *clarkei* except that they are smaller. The types of *clarkei* and *forresti* come from localities in Yunnan not widely separated and it has been assumed that they are wholly distinct species. Actual differences between them, however, are not too great to be bridged and, until clear proof to the contrary is produced, the suspicion may be entertained that not only *clarkei* but *forresti*, *monticolus* and others of the same series all may be subspecies of *swinhoei*.

The remaining members of the *swinhoei* group, *maritimus* and *hainanus*, offer further uncertainties. It was Bonhote's belief that *maritimus* and *monticolus* occupied different adjoining areas in Fukien, one on the coast and the other in the interior mountains,



but he treated both as subspecies of *macclellandi* and recorded specimens of both from one inland locality, Kuatun. The color characters by which he distinguished them, however, are largely or wholly accountable as phases of pelage. Those in the dull phase with indistinct stripes he called *maritimus* and those with bright distinct stripes *monticolus*. Specimens so far examined from the coast of Fukien are all in the dull pelage and, while other pelages are not represented from that region, there is no convincing evidence of color distinctions between *maritimus* and *monticolus*. Likewise there appears to be no difference in size, both being relatively large as compared to *hainanus* and quite equal to any of the larger forms of the genus except *swinhoei* and *clarkei*. The skulls, however, do offer a slight basis for separation. Only a few comparable skulls are at hand, but, so far as they go, those of *monticolus* have the anterior zygoma root somewhat compressed and sloping whereas those of *maritimus* have it abruptly bowed out or "squared." The sloping type is found also in *olivaceus*, *forresti*, and others of that series and the squared type is most pronounced in *vestitus* of the Peking region. As a working hypothesis, therefore, it is possible to entertain the idea that *monticolus* and *maritimus* are distinct and that one has its connections to the westward and the other in the north. This is strengthened by the occurrence of *olivaceus* and *hainanus* in Tonkin side by side and obviously distinct. That *olivaceus* in this region represents *monticolus* and *hainanus* represents *maritimus* may not be wholly certain but the inference is very strong. If there are two distinct species in Tonkin doubtless there are two in Fukien, although on account of imperfect material characterization of the latter is difficult. Complete gradation between *maritimus* and *hainanus* awaits proof with further specimens, but the difference between them is mainly one of size so no great assumption is required. Connection between *maritimus* and *vestitus* is suggested by resemblance in the shape of the skulls, but the differences in color and in the size of the audital bullae are pronounced and assumption of intergradation is probably not warranted at this time. Material representing *formosanus* is scanty but its close relationship to *maritimus* is scarcely to be questioned. *T. sauteri*, also from Formosa, is of doubtful status, its description indicating mainly characters which are likely to be seasonal.

It is plain that knowledge of this group is as yet quite imperfect. There is much need for competent field studies and for series from single localities taken at different seasons. The relationships of

*maritimus* and *monticolus* should be carefully worked out in Fukien and much new material should be obtained from the provinces of central and southern China. There could be no better indication that these provinces hold the solution of much that is puzzling in the distribution and relationships of Asiatic mammals. *Tamias* is doubtless common over much of China, yet we have specimens only from the four corners of the country with little or nothing along connecting lines or from the great central area.

At present there is perhaps no better course than to consider the *swinhoei* group as consisting of three species, *swinhoei*, *monticolus*, and *maritimus*. In doing so, some reservations may be made, but at least the treatment will be consistent with what knowledge we now have.

*Tamias macclellandi* group.—This group is mainly southern and lowland in distribution, ranging from northeastern India through Assam and northern Burma, southward into Tenasserim and the Malay Peninsula, and thence across Siam and Cochin China to Annam and Tonkin. In the western part of its range it represents the genus *Tamias* alone, but in the east in Annam and Tonkin it is found in juxtaposition with members of the *swinhoei* group. It does not enter China and apparently does not ascend to great heights elsewhere. It is characterized by relatively small size (toothrow 5.5–6 mm.) and, with one exception (*dolphoides*), by continuity of the subocular stripe and the outer light dorsal stripe. Complete gradation between all the named forms is scarcely to be doubted and in most cases is quite demonstrable. The names in this group most likely to have permanent recognition are the following:

*Tamias macclellandi* Horsfield, Assam.

*m. pembertoni* Blyth, Bhutan.

*m. barbei* Blyth, Tenasserim.

*m. novemlineatus* Miller, lower Siam.

*m. liantis* Kloss, Cape Liant, Siam.

*m. kongensis* Bonhote, Raheng, Siam.

*m. rodolphei* Milne-Edwards, Cochin China.

*m. dolphoides* Kloss, Cambodia.

*m. inconstans* Thomas, Bao Ha, Tonkin.

Two rather well-known names, *manipurensis* and *lylei*, are not included in this list. In the case of *lylei*, the omission is obviously necessary, since its type locality is but a few miles from that of *liantis* which antedates it. As for *manipurensis*, it may be granted that further material could conceivably substantiate it as a valid race, but it stands directly between *macclellandi* and *barbei* and seasonal variations in both seem sufficient to cover its supposed

characters. As stated elsewhere, the inclusion of *inconstans* as a subspecies in this series may need confirmation since complete intergradation is not yet fully demonstrated.

***Typhlomys cinereus chapensis* subsp. nov. BLIND TREE MOUSE.**

*Type* from Chapa, Tonkin. No. 32.4.19.7. British Museum. Adult female. Collected Nov. 24, 1929, by J. Delacour and W. Lowe. Orig. No. 1,321.

*Diagnosis*.-- Similar in color and general characters to *T. cinereus* of Fukien, but decidedly larger.

*Color*.-- Upper parts Deep Mouse Gray to Blackish Mouse Gray; under parts dull buffy, the hairs with dark bases; hands whitish; feet mainly dusky, the sides and the toes whitish; tail dusky, with or without a white pencil.

*Skull*.-- Generally similar to that of *cinereus*, but nearly 20 per cent larger.

*Measurements*.-- Average of ten adults measured by the collector: head and body 88.5 (80-98); tail 125 (117-135); hind foot without claws 22. Skull of type and an adult of *cinereus* (in parentheses): greatest length 25.6 (22.7); zygomatic breadth 14.2 (11.8); interorbital constriction 5.5 (4.8); nasals 7.6 (6.4); interparietal 10 x 4 (7.8 x 3.1); palate from gnathion 12.8 (10.8); postpalatilar length 9.3 (7.9); diastema 7.2 (5.8); upper toothrow 4 (3.6).

*Remarks*.-- Practically all hitherto known specimens of *Typhlomys* have proceeded from Fukien, China, the type region of *cinereus*. Its occurrence in Tonkin is therefore an important extension of range and its high degree of specialization marks it as one of the outstanding examples of mammals which are peculiar to Tonkin and southern China. The specimens from Tonkin show an abrupt and marked difference in size from those of Fukien although general characters are the same.

Apparently the habits of this animal, which should be exceedingly interesting, are still quite unknown. Fourteen specimens were obtained by Delacour and Lowe at Chapa, all received from native collectors.

***Rattus norvegicus socer* Miller. NORWAY RAT.**

*Epimys norvegicus socer* Miller, Proc. Biol. Soc. Wash., 27, p. 90, May, 1914--  
Taichow, Kansu, China.

K.-R.—Nguluko, Yunnan 85.

A very large series of Norway rats was obtained by Stevens at Nguluko, just north of Likiang. In view of their great abundance there, it is worthy of remark that they were not taken at any other locality on his entire route from Burma to northern Szechwan.

***Rattus rattus sladeni* Anderson. SLADEN'S BROWN RAT.**

*Mus sladeni* Anderson, Anat. Zool. Res. W. Yunnan, p. 305, 1878—Kakhyen Hills, Yunnan.

*Rattus rattus sladeni* Allen, Am. Mus. Novit., No. 217, p. 2, June 16, 1926.

K. - R. - Ba Nam Nhung, T. 7; Chapa, T. 1; Muong Boum, T. 3; Muong Mo, T. 2; Muong Yo, L. 1; Phong Tho, T. 2.

D. & L. 1929-30.—Chapa, T. 1; Pakha, T. 6.

DEL. 1931-32.—Thateng, L. 14.

Rats from the highlands of northwestern Tonkin answer fairly well to the description of *sladeni* as identified by Kloss and G. M. Allen. The distinction of *R. r. sikkimensis* from this form seems doubtful, but *R. r. hainanicus*, as judged by a single adult topotype, has larger audital bullae as well as a longer tail. Large bullae, however, are given as characteristic of *R. r. thai* (Kloss, Jour. Nat. Hist. Soc. Siam, 2, p. 286, 1917) from Raheng, Siam, of which no specimens have been examined in this connection.

Specimens referred to *sladeni* by G. M. Allen from Namting River at the Burma border and kindly loaned by the American Museum of Natural History include one very bright-colored example, but are essentially like the material from Tonkin. The largest of the Burmese specimens does not equal the largest from Tonkin. Respective measurements of these two are: total length 378, 433; tail 208, 232; hind foot 35, 38. In length of tail, therefore, the Tonkin rats equal *hainanicus*.

A specimen from Chapa is doubtfully placed here, its skull possibly being mismated. There is variation in the number of mammae, some specimens having twelve and others ten.

The specimens from southern Laos, of which only a few are adults, show no distinction from those of Tonkin. The females among them have twelve mammae.

***Rattus nitidus* Hodgson.**

*Mus nitidus* Hodgson, Ann. Mag. Nat. Hist., (1), 15, p. 267, 1845—Nepal.

*Mus griseipectus* Milne-Edwards, Nouv. Arch. Mus. Hist. Nat., Paris, 7, p. 93, 1871—Szechwan, China.

*Rattus nitidus* Hinton, Jour. Bomb. Nat. Hist. Soc., 26, p. 412, May, 1919.

*Rattus griseipectus* Allen, Am. Mus. Novit., No. 217, p. 7, June 16, 1926.

K. R. Szechwan: Kulu 13; Muli 1; Yatsu 1. Yunnan: Lutzulu 3; Nguluko 1; Yungning 16.

Receipt of a large series of *Rattus nitidus* from Sikkim reveals essential agreement with material from southern and western China for which the name *griseipectus* has recently been in use. Even subspecific recognition of *griseipectus* seems doubtful. In some of the Chinese specimens there is a tendency to the development of an irregular white line on the breast or midventral region. Elsewhere the hairs of the under parts are with dark bases and dull buffy or silvery whitish tips. In the series from Sikkim similar variations are found. *Rattus nitidus obsoletus* from the Chin Hills, Burma, has not been examined. Two specimens without skulls in the Delacour collection from Chapa, Tonkin, seem closely allied to or identical with *nitidus*. Under the name *griseipectus* the species has been recorded by Allen from Fukien and Hainan, but it appears to be rare in Tonkin.

### ***Rattus concolor* Blyth. LITTLE BURMESE RAT.**

*Mus concolor* Blyth, Jour. As. Soc. Beng., 28, p. 295, 1859. Schwegyin, Burma.

DEL. 1931 32.—Pakse, L. 1.

K.-R. --Phouc Mon, Quangtri, A. 10.

WULSIN 1924.—Luang Prabang, L. 1.

This small, dark-colored rat is evidently confined to river highways and the coast region. Since it is habitually a dweller in houses, it may have been introduced into Indo-China. Originally described from Burma, it has been recorded also from Siam and the Malay Peninsula. The present Annam record seems to be the easternmost for the species. In some specimens there is a dark line on the feet as in *R. flavipectus*, but the smaller size, shorter pelage, and the possession of only four pairs of mammae are unmistakable.

A specimen from Luang Prabang belonging to the United States National Museum is tentatively referred to *concolor* although it is much more rufescent than the others and has various minor peculiarities. One from Pakse, farther south, on the left bank of the Mekong River, is normal.

*R. sakaratensis* of Siam (Gyldenstolpe, Kungl. Svenska Vet. Handl., 57, No. 2, p. 46, pl. VI, figs. 6, 9, 1916), as noted by Kloss

(Jour. Nat. Hist. Soc. Siam, 3, p. 381, 1919), seems not to be allied to *concolor*.

***Rattus flavipectus* Milne-Edwards. BUFF-BREASTED RAT.**

*Mus flavipectus* Milne-Edwards, Nouv. Arch. Mus. Hist. Nat., Paris, 7, p. 93, 1871 Mouping, Szechwan.

K.-R. -Bactan Trai, T. 1; Ba Nam Cai, T. 9; Ba Nam Nhung, T. 13; Chapa, T. 3; Lai Chau, T. 3; Lieng San, T. 1; Muong Boum, T. 2; Muong Mo, T. 23; Muong Moun, T. 12; Muong Yo, L. 3; Nguluko, Yunnan 2; Nong Lum, T. 1; Pa Ham, T. 9; Phong Saly, L. 18; Phong Tho, T. 5.

D. & L. 1929-30.—Chapa, T. 2; Pakha, T. 2.

WULSIN 1924.—Lai Chau, T. 16.

As indicated by the large number of specimens collected, this rat is very common in the highlands of northwestern Tonkin. On the other hand, only two specimens appear in the collections made by Stevens in Yunnan and, although the type came from Szechwan, recent collectors have taken the species there only in small numbers. So far as examined, the northern specimens have the dingy appearance usual in house rats while the southern ones mostly are clean, bright and trim-looking as in a native species.

At present, it is difficult to make any separation of a southeastern form. The material from Tonkin shows considerable variation in color of the under parts, but the proportion of specimens in which the entire lower surface is heavily ochraceous is very large and the breast stripe is practically always well marked. Specimens from Fukien seem to be similar, although no very satisfactory material is available, and the same is true of more northern specimens.

Apparently there is no tendency in Tonkin toward *R. f. yunnanensis* with its lighter under parts and heavier molars. This latter form, however, is closely allied to a representative of *flavipectus* found in northern India and described by Hinton as *Rattus rattus tistae* (Jour. Bomb. Nat. Hist. Soc., 26, p. 68, 1918). A large series from Sikkim and Bengal Presidency recently received at Field Museum amply shows this to be the case. It is evident, therefore, that *tistae* (and probably also *bhotia*) should be associated with *flavipectus* rather than with *rattus*. As compared with *flavipectus* from Tonkin, *tistae* is somewhat larger with a longer foot and heavier molars and much lighter under parts. Specimens from Upper Burma referred to *yunnanensis* by G. M. Allen appear to be intermediate

between *hstae* and Tonkinese *flavipectus*, although probably nearer *hstae* with which they agree in their heavier molars. Specimens from the actual type locality of *yunnanensis* are not available and will be required before names can be allocated with certainty. Meanwhile there is strong probability that *hstae* should be united with *yunnanensis*.

***Rattus flavipectus molliculus* Robinson and Kloss.**

*Rattus molliculus* Robinson and Kloss, Ann. Mag. Nat. Hist., (9), 9, p. 97, 1922—Daban, Phanrang, Annam.

K.-R.—Phouc Mon, Quangtri, A. 30.

A lengthy and variable series of rats from east-central Annam appears closely allied to the form described as *Rattus molliculus* from southern Annam. This conclusion is based mainly upon the original description without actual comparison of specimens. It appears also that there is connection with *R. flavipectus*, since the series in hand shows numerous evidences of intergradation with that species.

In color this series is considerably paler than *flavipectus* and the upper parts in some specimens are not far from those of *R. h. exiguus*. The under parts range from those that are entirely white to those with pure white only on the lower belly, the hairs elsewhere having dark bases and white or pale buffy tips. In most cases the body color is continued to the upper side of the front feet, but is paler and less contrasted than in *flavipectus*. The hind feet are entirely white in twenty-four specimens, but in six others a dark marking is evident. The fulvous breast-marking varies from a scarcely discernible spot to a wide stripe extending to the forepart of the belly. Adults are slightly larger than in *flavipectus*. A very large one and one of average size offer the following collector's measurements: total length 401, 346; tail 227, 177; hind foot 35, 33. The number of mammae is usually ten, but in one specimen, at least, there are twelve.

*R. molliculus* as described does not show fulvous breast-markings and is evidently like some of the lighter-colored examples in the present series. It is recorded from Ba Na Kham, east of Outeradit, northern Siam, and from Ban Tuoi, Mekong River, near Pissai, Laos, as well as from the type locality in Annam.

***Rattus humiliatus exiguus* Howell.**

*Rattus rattus exiguus* Howell, Proc. Biol. Soc. Wash., 40, p. 43, March, 1927—southwest of Yenping, Fukien.

K.-R.—Phouc Mon, Quangtri, A. 1.

A single immature specimen may be referred to this form which appears to differ from typical *humiliatus* mainly in its wholly blackish tail. A "cotype" of *humiliatus* collected by Père David and now labeled "Suenhoafu, Pekin" is in the British Museum. The end of its tail is missing, but otherwise it is in good condition although doubtless originally preserved "in spirit." The color is decidedly rufescent, perhaps partly due to preservative, but another specimen collected more recently (1903) near Nanking is only slightly paler. The feet are white in both specimens and the tail is definitely bicolored. This last character distinguishes it from specimens from Fukien, Hainan, and Annam, all of which have entirely blackish tails.

It seems evident, therefore, that two eastern forms of *humiliatus* may be recognized, one with a bicolored tail ranging from Nanking northward and the other with a blackish unicolored tail extending south to northern Annam. For the southern form, the name *exiguus* is available. Examination of the type and several topotypes of *exiguus*, loaned by the United States National Museum, shows them to be allied to *humiliatus* rather than to *rattus*. Aside from their unicolored tails, they differ from *humiliatus* in paler, less rufescent color. Externally they agree with series from Hainan and the cranial differences which may be noted are supported by such a small number of specimens and localities that separation of another form from Hainan does not yet seem advisable. The type of *exiguus* and one adult topotype have skulls in which the interorbital region is more abruptly constricted, the rostral part of the skull more slender, and the braincase wider than is usually the case in skulls from Hainan. The single specimen from Annam shows a narrow midventral line of buffy like the body color. Such a line does not appear in the small series from Fukien, but in a considerable number from Hainan there is at least one in which a similar line appears.

### ***Rattus humiliatus celsus* Allen.**

*Rattus humiliatus celsus* Allen, Am. Mus. Novit., No. 217, p. 5, June, 1926—  
Taku Ferry, west bank of Yangtze River, Yunnan.

K.-R.---Baurong, Szechwan 1; Mulu, Szechwan 4.

These are somewhat brighter, more rufescent in color than topotypes loaned for comparison by the American Museum of Natural History. The northernmost specimen, from Baurong, has especially heavy cheek-teeth and the whole series, as compared with specimens



from Hainan, indicates that heaviness of the molars is probably a marked character of the race.

### ***Rattus fulvescens* Gray.**

*Mus fulvescens* Gray, Cat. Mamm. Nepal & Thibet, ed. 1, p. 18, 1846 Nepal. Cotypes in British Museum.

*Leqada jerdoni* Blyth, Jour. As. Soc. Beng., 32, p. 350, 1863—Sikkim.

*Epimys fulvescens* Wroughton, Jour. Bomb. Nat. Hist. Soc., 24, p. 427, 1916—*fulvescens* replaces *jerdoni*.

*Rattus fulvescens* Wroughton, supra cit., p. 772, 1916.

*Rattus huang vulpicolor* G. M. Allen, Am. Mus. Novit., No. 217, p. 14, June 16, 1926—Namting River at Burma border.

K.-R.—Chapa, T. 6; Lieng San, T. 4; Lung Lunh, A. 1; Muong Boum, T. 1; Phong Saly, L. 13.

D. & L. 1929-30.—Chapa, T. 47.

This species, long known by the name *jerdoni*, is represented in the British Museum by a few modern specimens from Nepal or nearby localities and by a large number from Sikkim and Assam somewhat farther east. The series includes both the spiny and the soft pelages together with variations and different stages between the two, altogether presenting a great range of color. A further series from Sikkim is now in Field Museum together with some thirty-six specimens from Fukien as well as a few from Hainan. Careful study of all this material in connection with the large accessions from Indo-China indicates that as a species *fulvescens* ranges at least from northeastern India across northern Burma and Tonkin and extends into China in Szechwan, Yunnan and Fukien. Within this area, it is difficult or practically impossible to differentiate more than two subspecies, typical *fulvescens*, which is the more southern form, and *Rattus fulvescens huang*, which appears to be confined to China.

Two topotypes of *R. h. vulpicolor*, loaned by the American Museum of Natural History, are quite indistinguishable from specimens of *fulvescens* in the same pelage from Sikkim. They also agree in detail with various examples from Tonkin. The naming of *vulpicolor* by Allen was, in effect, only the recognition of *fulvescens* which was, at the time, unknown to him.

Although a lengthy series is available from Fukien, the winter pelage is not well represented and there is only slight indication that this pelage may be brighter than in *fulvescens*. Aside from the possibility that it may average slightly smaller and shorter-tailed,

*huang* seems characterized mainly by a reduction or absence of dusky markings on the feet. These markings are not invariably present in *fulvescens* but are very pronounced in a large percentage of specimens. The position of specimens from Hainan is doubtful. G. M. Allen referred them to *huang*, but with a considerably smaller series than that examined by him, I find them easier to place with *fulvescens* from Tonkin. Although taken in December, they are in bright-colored, spiny pelage. They average slightly larger than *huang* and in several instances have dark markings on the feet.

The disposition of *Mus ling* (Bonhote, Proc. Zool. Soc. Lond., Abstr. No. 23, p. 19, 1905) from Chin Feng Ling, Fukien, is perhaps uncertain, but probabilities favor its elimination as a pure synonym of *huang*. Smaller size is all that could be claimed for it and in most specimens examined this seems due to immaturity. The type of *ling* in the British Museum is at most adolescent although its teeth show slight signs of wear. A specimen from Quangtri, Annam, is closely similar to this type, but is obviously not fully mature. In a large series from Fukien in the British Museum, doubtless determined by Bonhote, the great majority are called *ling* and are preponderantly immatures, while only a few very old and rich-colored examples are labeled *huang*. In all large series the immatures are noticeably smaller than adults and among senescents individuals of exceptional size are not uncommon. Mere size in small series or individuals, therefore, may be misleading. Eastern series of *fulvescens* average very slightly larger than western but it does not seem sufficient ground for separation.

The relationship of *fulvescens* to southern forms is obvious in several instances, especially in that of *R. f. bukit* which can at most be no more than a subspecies and has been so regarded by Gyldenstolpe (Jour. Nat. Hist. Soc. Siam, 3, p. 165, 1919). It is somewhat duller in color than *fulvescens* but otherwise agrees closely. A specimen from Lung Lunh, Annam, in the present collection may be approaching it. Other southern forms may be allied, but close comparisons have not been made. *R. f. mentosus*, which was also examined in this connection, is perhaps a local form of *fulvescens*, but the material representing it is very unsatisfactory, and, until topotypes are obtained, including different ages and pelages, its status is likely to be a matter of opinion. The type series includes only very old, oversized examples with much worn, but rather heavy teeth, and the skins are in an unusual, worn, grayish pelage. The skulls are long and narrow with very long, cuneate nasals which,

with the heavy molars, suggest relationship to *confucianus*. The audital bullae, however, are relatively small as in *fulvescens*. This character usually distinguishes *fulvescens* from *confucianus*, but whether *mentosus* is a local form of *fulvescens* or of *confucianus* is not certain.

### ***Rattus fulvescens champa* Robinson and Kloss.**

*Rattus bukit champa* Robinson & Kloss, Ann Mag Nat Hist., (9), 9, p 96, 1922 Langbian Peaks, Annam.

DEL. 1931 32.—Thateng, L. 7.

These are darker and more spiny than specimens of *fulvescens* from Tonkin. In view of this and their geographical position, their reference to subspecies *champa* seems justified.

### ***Rattus confucianus* Milne-Edwards.**

*Mus confucianus* Milne-Edwards, Nouv. Arch Mus Hist. Nat., Paris, 7, p 93, 1871 Szechwan.

K.-R.—Szechwan: Muli 8; Tupakeo 1; 20 miles south of Tze La Lee 5; Wushi 13; Yulongkong 18. Yunnan: near Lutzulu 2; district north of Likiang in bend of Yangtze River 3; Nguluko 6.

D. & L. 1929-30.—Vicinity of Chapa, T. 73.

Stevens did not take this species until he reached the Likiang highlands. His collection includes both winter and summer specimens, showing the usual color variations and no example which is of unusual size.

The very large series from the vicinity of Chapa, Tonkin, covers a wide range of variation in size and color. Reference of this series to *confucianus* is not wholly satisfactory, but, until relationships in the group are better understood, it seems advisable. A considerable number of the specimens are labeled "Lo Qui Ho," which is in the highland above Chapa at an elevation of 9,000 feet or more. Others, obviously the same, are simply labeled "Chapa"; but, since all were brought in by natives, there is no certainty as to the exact elevation at which any particular one was taken. Apparently *R. confucianus* is found exclusively at the higher elevations and is replaced at lower levels by *R. fulvescens*, with the possibility that both may occur together at certain points.

Distinction of *R. confucianus* and *R. fulvescens* in overlapping areas, while generally obvious, is often very difficult as to individual specimens. In *confucianus* and its forms, the size is larger, the color

darker, the tail is frequently white-tipped and the breast marked with fulvous; the audital bullae are larger and more globose, the nasals longer and more compressed behind, and the molars are heavier. Apparent contradictions in these characters or in the combination of them crop out in disquieting manner in a number of instances, but they hold in such a large proportion that their significance is scarcely to be doubted.

The specimens from the highlands of Tonkin apparently average somewhat larger and with coarser and more richly colored pelage than typical *confucianus*, but in view of the names *andersoni* and *excelsior*, applied to northern examples of large size, it is evident that size variations may be considerable. The Tonkin material differs from *R. c. lotipes* of Hainan in possessing pronounced dark markings on the feet.

Measurements of ten of the larger specimens from Tonkin are as follows: head and body 162.6 (152–173); tail 235 (220–255); hind foot with claws (measured dry) 33.3 (32–35). It appears, therefore, that some of them nearly or quite reach the size of *R. andersoni*. A large skull measures: greatest length 43.5; zygomatic width 18; interorbital constriction 6.4; nasals 16.8; diastema 12; palatine slits 7.5; cheek-teeth 6.6. If the number of specimens were limited to a few representing extremes, a nomenclatural division might easily be induced, but with very large series at hand, the only satisfactory conclusion is that the variations and relationships in this group will not be thoroughly understood until a competent student combines field observation with subsequent study of much more and better material than is now in hand.

### ***Rattus indosinicus* sp. nov.**

*Type* from Chapa, Tonkin. No. 31,993 Field Museum of Natural History. Young male. Collected Feb. 15, 1929, by Harold J. Coolidge, Jr. Orig. No. 6.

*Diagnosis.* A rat of moderate size, with soft or spiny pelage according to age and season, and tail about 40 per cent longer than head and body. Superficially similar to *R. confucianus* and *R. fulvescens*, but tail wholly blackish and hallucal claw somewhat reduced in adaptation to scansorial habits. Mammae 2-2=8.

*Color.*—Upper parts mixed dusky and Ochraceous Tawny, the sides only slightly paler than the back. Under parts entirely pure white to roots of hairs, in older specimens becoming creamy or

tinged with yellowish. Fore feet white or with an extension of body color to the base of the toes; hind feet similar, the dark area variable and not well defined in the younger examples; tail entirely blackish both above and below.

*Skull.*—Generally similar to that of *R. confucianus* but with a more expanded braincase, wider interorbital space, shorter nasals, and more highly developed supraorbital ridges. Similar also to that of *Chiromyscus chiropus* except in smaller size, in less prominent postorbital processes, and in more projecting infraorbital plate. Cheek-teeth relatively wide, heavy and brachyodont; first upper tooth with its anterior lamina only slightly indented on its antero-internal surface.

*Measurements.*—Collector's measurements of three specimens, adult, subadult, and adolescent: total length 331, 324, 285; tail 192, 192, 160; hind foot 29, 31, 29. Skulls of same specimens: greatest length 38.1, 36, 34; condylo-basal length 35, 33.5, 31; zygomatic width 16.4, 17.6, 16.4; interorbital constriction 6.1, 6, 6.1; width of braincase 14.9, 15.6, 14.8; nasals 12.2, 12.3, 12.3; interparietal 10.4 x 6.6, 11.2 x 5.4, 10.5 x 5.4; diastema 10.1, 9, 8.2; width of infraorbital plate 4, 3.7, 3.6; cheek-teeth (crowns) 6.2, 5.8, 6.3; (alveoli) 7, 6.4, 7; width of front upper molar 1.9, 1.9, 2.

*Remarks.*—Attention was at first drawn to this species by the wholly blackish tails of the three specimens representing it. These three specimens, all from Chapa, include one in spiny pelage, taken by Delacour and Lowe, and two obtained by the Kelley Roosevelt Expedition, one of the latter in very long, soft pelage without spines, and the other with but a few well-concealed spines. The mammary formula,  $2\ 2=8$ , is well shown in one specimen. In a hasty preliminary assorting of the collections, before skulls were cleaned, one of them was placed with *Chiromyscus chiropus* in the belief that it might be a young example of that animal and the two others fell among the supposed variations of *R. confucianus*. In all the large series of *confucianus* and *fulvescens* from Chapa, numbering well over one hundred specimens, invariably the tail is at least irregularly bicolored, so these two with dark tails were later eliminated.

The discovery that certain cranial characters were correlated with the dark tails established the distinctness of the species from *confucianus* and *fulvescens*. It is possible that further study will demonstrate a close relationship to *R. cremoriventer*, a dark-tailed species of the upper Malay Peninsula with which actual comparisons

have not been made. Apparently *cremoriventer* is smaller and more spiny, with weaker teeth and a narrower infraorbital plate. It seems not to have been recorded in any of the numerous collections from continental Siam.

The very small representation of this species in the collection is perhaps accounted for by the probability that its habits are more arboreal than is the case with the other rats of the region excepting *Chiromyscus*. It may not be especially allied to *Chiromyscus*, but in cranial characters there is little except size to separate it. In the British Museum are two specimens which may deserve further examination as possibly belonging to this species. One of these is from the Chin Hills, fifty miles west of Kindat, Burma (No. 16.3.26.58.) and the other from Margherita, Naga Hills, Assam (No. 20.6.7.34.).

#### **Rattus sp. ?**

A single specimen from Phong Saly, Laos, obviously belongs to a species not otherwise represented in the collection. Without material representing many of the species described from Siam, it seems best not to hazard an opinion as to its relationships. It is dull brown in color, the under parts uniformly with dark-based hairs tipped with buffy. The pelage is very soft and full, the ears rather large and the hind feet very large. The skull is relatively flat, with a broad braincase, small audital bullae, and heavy cheek-teeth. Collector's measurements are: total length 299; tail 153; hind foot 36.5.

#### **Rattus surifer finis Kloss.**

*Epimys surifer finis* Kloss, Proc. Zool. Soc. Lond., p. 51, March, 1916—Klong Menao, southeastern Siam.

K.-R.—Phong Saly, L. 2; Phouc Mon, Quangtri, A. 3.

DEL. 1931-32.—Thateng, L. 14 (8 alc.).

The specimens from Phong Saly are quite as bright-colored as typical *surifer*, but they agree with *finis* in the extension of white areas from the arms and legs to the hands and feet. The specimens from Quangtri are slightly smaller, darker, and with the under parts pure white instead of creamy. *Rattus s. siarma* (Kloss, Jour. Nat. Hist. Soc. Siam, 3, p. 75, 1918) of northwest Siam has not been examined. The specimens from southern Laos are soft-pelaged, practically without spines, and may be approaching *Rattus surifer moi* of southern Annam.

**Rattus sabanus revertens** Robinson and Kloss.

*Rattus sabanus revertens* Robinson and Kloss, Ann. Mag. Nat. Hist., (9), 9, p. 95, Jan., 1922—Daban, Phanrang, Annam

K. R.—Phong Saly, L. 1; Phouc Mon, Quangtri, A 1.

Besides two specimens in Field Museum, there are from the same region four others in the British Museum, one from Baikan, Tonkin, one from Napé, Laos, and two from Xieng Kuang, Laos. These northernmost representatives of the *sabanus* group, which is essentially Malayan, may be referred tentatively to *revertens* although comparison with the type of that form has not been made. Externally they are remarkably similar to *R. s. vociferans* of peninsular Siam and Tenasserim, but certain slight cranial characters seem to distinguish them. The root of the zygoma is somewhat weaker, the infraorbital plate averages narrower, more sloping, and the anterior palatine foramina are longer and more expanded laterally, in this last respect approaching some of the forms of *R. edwardsi*, notably *R. e. listeri*.

That there is any actual gradation between the *sabanus-vociferans* series and *edwardsi* is perhaps improbable, but their very close relationship is scarcely to be doubted. A somewhat cursory examination of the two groups leads to a pronounced feeling that they are quite distinct, but constant cranial characters that will hold for all the forms of both groups are difficult to define. Comparing only typical skulls of *edwardsi* and *vociferans*, it is found that *edwardsi* is larger, with a very heavy muzzle, large palatal slits, larger audital bullae, heavier molars and larger interparietal. In most cases, the size of the interparietal coupled with that of the molars is sufficient, but with forms like *listeri* in one series and like the present one in the other, confidence might be shaken if it were not for the coloration and external characters.

The single immature example from Quangtri, Annam, has the distal half of the tail white as in the unique type of *R. s. herberti* but shows no indication of extension of white to the eye as in that form.

**Rattus sabanus** subsp.

DEL. 1931-32.—Thateng, L. 2.

These may be regarded provisionally as intermediates between *R. s. revertens* and *R. s. herberti*. They are smaller and paler than *revertens*, the under parts are white rather than yellowish white, and

in one of them the white is only narrowly separated from the lower edge of the eye. The terminal part of the tail is white for two-thirds its length in one specimen and one-third in the other.

***Rattus edwardsi* Thomas. EDWARDS'S GIANT RAT.**

*Mus edwardsi* Thomas, Proc. Zool. Soc. Lond., p. 587, pl. 44, 1882—Kuatun, Fukien, China.

K.-R.—Lieng San, T. 2; Muong Moun, T. 1; Phong Saly, L. 1.  
D. & L. 1929-30.—Chapa, T. 16.

Five adults from Ngai Tio, Tonkin, in the British Museum seem nearest to typical *edwardsi* although, as suggested by Thomas (1925, p. 503), they tend somewhat towards *R. edwardsi listeri*. Color differences between *edwardsi* and *listeri* are difficult to appreciate, but in general *listeri* seems to be slightly more saturate with ruddier tones, less grayish than *edwardsi*. The skull of *edwardsi* differs from that of *listeri* in larger size, heavier molars, larger palatal slits, and larger audital bullae. In respect to the palatal slits the Tonkin specimens are nearer to *listeri*, but in all the other characters mentioned they are nearer to *edwardsi*. The type of *listeri* has an abnormally short tooththrow, scarcely longer than in *vociferans*, but other specimens from Assam, as well as those representing *R. edwardsi garonum*, have somewhat larger molars, nearly or quite equaling those of the skulls from Tonkin.

The various forms of *R. edwardsi*, both continental and insular, might conveniently be regarded as subspecies. In most cases gradation is already apparent, while in others it is more than probable. The following list of them is perhaps incomplete, but may be helpful to the next worker with the group.

*Rattus edwardsi* Thomas, Kuatun, Fukien, China.

*c. listeri* Thomas, Pashok, Darjeeling, India.

*c. garonum* Thomas, Garo Hills, Assam.

*c. qigas* Satunin, near Lun-gan-fu, Szechwan.

*c. ciliatus* Bonhote, Gunong, Selangor, Malay States.

*c. setiger* Robinson and Kloss, Barison Range, Sumatra.

*c. milleli* Robinson and Kloss, Dalat, southern Annam.

***Rattus bowersi latouchi* Thomas. LATOUCHE'S GIANT RAT.**

*Mus latouchi* Thomas, Ann. Mag. Nat. Hist., (6), 20, p. 113, 1897—Kuatun, Fukien, China.

K.-R.—Chapa, T. 1; Phong Saly, L. 4.

D. & L. 1929-30.—Chapa, T. 18.



Specimens in the British Museum from Backan, Tonkin, Xieng Kuang, Laos, and Ngai Tio, Tonkin, all of which are called *bowersi* by Thomas, might better be referred to *latouchei* which is no more than a slight subspecies of *bowersi*. Perhaps *latouchei* may be somewhat paler in color than *bowersi* but otherwise it seems to differ only in one slight cranial character. In *bowersi* the nasals are extended posteriorly beyond the premaxillae whereas in *latouchei* the nasals and premaxillae end evenly. In this respect the Tonkin and Laos specimens agree with *latouchei* from Kuatun, Fukien, China.

The skull of *R. bowersi* is markedly different from that of *R. edwardsi* and other so-called "giant rats" of southeastern Asia. The braincase is peculiarly truncate behind, giving an essentially triangular appearance to the whole skull. The interparietal is frequently subtriangular with an anterior apex instead of being elliptical. The orbital ridges are rather weak and mainly confined to the frontals, their continuation over the parietals being faint. The audital bullae are relatively large and the incisors pale. A closely related species is *R. ferreocanus* of the Malay Peninsula, which has smaller audital bullae, but is otherwise so similar to *bowersi* that intergradation between the two is not improbable. Other species of smaller size and well distinguished, but having the same type of skull and similar external appearance, are *manipulus*, *mackenziei*, and *berdmorei*. *Rattus bowersi lactiventer* also has been named from northwestern Siam (Kloss, Jour. Nat. Hist. Soc. Siam, 3, p. 80, 1919).

### **Chiromyscus chiropus** Thomas. BURMESE CLIMBING RAT.

*Mus chiropus* Thomas, Ann. Mus. Civ. Stor. Nat. Gen., (2), 10, p. 884, 1891; ibid., p. 935, pl. 11, figs. 4-7, 1892. Carin Hills, northeast of Tounghoo, southern Burma.

*Chiromyscus chiropus* Thomas, Proc. Zool. Soc. Lond., p. 503, 1925.

K. R. Ba Nam Nhung, T. 1.

D. & L. 1929-30. Chapa, T. 1.

REC. 1925-29.— Bao Ha, T. 1; Dakto, A. 2; Xieng Kuang, L. 1.

With the exception of the type in alcohol, the specimens enumerated above include all the known examples of this interesting rat. One of the recent examples is the first female to be examined and affords the information that the mammary formula is 2-2=8.

### **Mus musculus** Linnaeus. HOUSE MOUSE.

*Mus musculus* Linnaeus, Syst. Nat., ed. 10, 1, p. 62, 1758.

K.-R.—Lai Chau, T. 1; Nguluko, Yunnan 9.

The only example of the common house mouse in the entire collection from Indo-China is one taken at Lai Chau by Coolidge. A small series was obtained in Yunnan by Stevens.

**Mus bactrianus kakhyensis** Anderson.

*Mus kakhyensis*, Anderson, Anat. Zool. Res. W. Yunnan, p. 307, 1878--Ponsee, Kakhyen Hills, Yunnan.

*Mus bactrianus kakhyensis* Allen, Am. Mus. Novit., No. 270, p. 9, May, 1927.

K. R.- Ba Nam Cai, T. 3; Muong Boum, T. 13; Muong Mo, T. 1; Muong Moun, T. 5; Phouc Mon, Quangtri, A. 6; Phong Saly, L. 1.

These agree in detail with specimens from Hainan referred to this subspecies by G. M. Allen.

The external resemblance of the Indo-Chinese specimens to species recently referred to "*Leggada*" (as *nitidulus* and *nagarum*) and also the cranial characters shown by them led to a somewhat hasty reexamination of the evidence for the separation of *Mus* and *Leggada* as full genera. This is a matter which Oldfield Thomas evidently had in mind for further investigation. In referring specimens from Tonkin and Annam to *Mus dubius*, he states (1927, p. 55): "This determination is of necessity merely provisional, as the complexities of the *Mus-Leggada* group are such as to demand quite a special study, with more material than is yet available."

Since the specimens which Thomas had in hand were obviously different from typical *dubius*, I am inclined to infer, from a considerable knowledge of his character and methods, that he refrained from definite action, not because of any doubt as to their distinctness from *dubius* and its allies, but because his faith was somewhat shaken as to the characters previously used in separating *Mus* and *Leggada*. It was this question that he wished to have subjected to careful study. I am unable to devote the time necessary for such a study, but, after a brief review of the Asiatic forms, am much impressed with the difficulties involved in maintaining any sharp line between *Mus* and *Leggada*. Their status is plainly only provisional and, under these circumstances, it seems less confusing to subordinate them to no more than subgeneric rank until such time as a comprehensive study can be made.

The present form, although doubtless properly placed as a subspecies of *bactrianus*, shows slight tendencies toward the characters of *Leggada*. However, there can be no doubt that it falls definitely

into the section *Mus*, as defined by Thomas (Jour. Bomb. Nat. Hist. Soc., 26, pp. 417-420, May, 1919). The genotype of *Leggada* (*booduga*), on the other hand, is one of those species in which there is some approach to *Mus*, since it has rather broad, flattened nasals, a wide infraorbital plate which extends forward beyond the middle of the palatal slits, and a muzzle which, although longer than in typical *Mus*, is shorter than in most other species assigned to *Leggada*.

In the considerable series of *kakhyensis* now available, there is some variation in size. A series in the British Museum from Kontoun, southern Annam, appears very closely allied, but averages smaller, with skulls not so elongate as in the northern specimens from Tonkin.

### ***Mus* (*Leggada*) *nitidulus annamensis* Kloss.**

*Tautatus thai annamensis* Kloss, Ann. Mag. Nat. Hist., (9), 9, p. 99, 1922 —  
Dalat, Langbian Plateau, Annam.

DEL. 1931-32. Thateng, L. 3.

The names *thai* and *annamensis* (*Tautatus thai* Kloss, Jour. Nat. Hist. Soc. Siam, 2, p. 280, Dec., 1917; idem, 3, p. 71, 1918; *Tautatus thai annamensis* Kloss, supra cit.) seem to apply to forms of the *Leggada* series, and the generic name *Tautatus*, which was coupled with them is, therefore, an undoubted synonym of *Leggada*. This was the conclusion of Thomas, who left notes to this effect written on the margin of his personal copies of the original descriptions. Of *Tautatus thai*, he says, "Seems to be = *Leggada cooki* Ryley"; of *annamensis* his notation is, "Probably local race of *nitidula*."

The types of both *thai* and *annamensis*, with additional specimens, were submitted to Thomas for examination shortly before his death and are still in the custody of the British Museum where I have been privileged to examine them. The type of *annamensis* is imperfect about the palatal and infraorbital regions but is clearly a long-muzzled animal with the heavier molars which usually distinguish from *Mus*. A topotype accompanying it leaves no doubt that this is the case. It is dark-colored and short-tailed and doubtless recognizable specifically or subspecifically. A third specimen (No. 3,397) from Dalat, Annam, however, is plainly *Mus* and probably allied to *kakhyensis* like those from Kontoun, Annam.

The type of *thai* is quite immature and has the nasals shorter and the palatal slits more backwardly extended than usual in *Leggada*. A topotype with it is somewhat older and easily recognized as a *Leggada*. Careful examination of the two specimens is fairly

convincing that they are conspecific, the shortness of the nasals in the type being outweighed by the slenderness of its muzzle, the slender and pale-colored upper incisors, the relatively heavy molars, and the general size of the skull which is somewhat greater than in *Mus kakhjensis* of corresponding age. Therefore, both *thai* and *annamensis* fall into the *Leggada* section.

Three specimens from southern Laos, received too late for comparison with material in the British Museum, are tentatively referred to *annamensis*, this being regarded as a subspecies of *nitidulus*.

***Mus (Leggada) pahari gairdneri* Kloss.**

*Leggada pahari gairdneri* Kloss, Jour. Nat. Hist. Soc. Siam, 4, p. 60, 1920—  
Me Taw, 40 miles n.w. of Raheng, Siam.

D. & L. 1929 30.—Chapa, T. 15.

REC. 1925 29.--Dakto, A. 1; Ngai Tio, T. 1; Xieng Kuang, L. 2.

The series from Chapa averages paler and more grayish than in typical *pahari* from Sikkim. This is the principal character noted in the two specimens forming the basis of the name *gairdneri*. It is probable, therefore, that the form covers a considerable area in Siam and Indo-China.

***Dacnomys millardi ingens* subsp. nov. LARGE-TOOTHED GIANT RAT.**

*Type* from Phong Saly, Laos. No. 31,986 Field Museum of Natural History. Adult female. Collected May 1, 1929, by Russell W. Hendee. Orig. No. 5,485.

*Diagnosis.* Similar in color to typical *millardi* of Sikkim; tail and ears shorter; skull shorter and heavier, with shorter nasals, broader interorbital space, heavier anterior zygoma root, and broader cheek-teeth.

*Color.* Upper parts uniformly mixed Cinnamon-drab and dusky, producing a general effect of Fuscous to Bone Brown; hands and feet brownish; tail set with very short, sparse hairs, dusky with a few irregular pale blotches; under parts variegated, the throat, inner sides of arms, axillary and inguinal regions pure white to roots of hairs; forebreast and belly mixed cinnamon-drab and whitish, the hairs with pale slaty bases.

*Skull.*—As compared with an adult skull of *millardi* (not the type), the skull is shorter throughout; nasals shorter; anterior

zygoma root heavier; interorbital space wider; interparietal smaller and less produced forward; toothrow shorter and broader; anterior cheek-teeth slightly wider than the palatal space between them.

*Measurements.* Type: total length 581; tail 308; hind foot 55; ear from notch (dry) 19.5. Skull of type and adult female of *millardi* (in parentheses): greatest length 55.8 (59.5); condylo-basal length 53.5 (55.6); zygomatic width 27.6 (27.5); nasals 21.5 x 6.8 (24 x 6.3); interorbital constriction 8.7 (7.8); interparietal 14.5 x 7.1 (15.8 x 10); diastema 15.2 (15.5); bony palate 12.1 (12.5); upper toothrow (alveoli) 11.8 (12.7); width of anterior cheek-tooth 4 (3.8).

*Remarks.* The discovery of the rare giant rat known as *Dacnomys* in Indo-China is of considerable interest as an extension of the range of the genus. The single specimen collected by Mr. Hendee is an adult labeled female but in the prepared skin mammae are not evident. Fortunately a fully adult specimen of *millardi* is at hand for comparison. This was taken by Herbert Stevens on the recent C. Suydam Cutting Sikkim Expedition for Field Museum. The locality is Mangpu, Bengal Presidency, India, and the specimen apparently constitutes the third known example of the species. This specimen is mainly dark-colored below with only slight suggestion of the white markings shown by the type as described, so it is evident there is considerable variation in this respect. It is a little duller-colored and harsher-pelaged than the Indo-Chinese specimen, but distinctions of color seem very doubtful.

Comparison of the two skulls in hand reveals so many points of difference that the conclusion is unavoidable that they justify at least subspecific separation. Some of these differences may not hold good when series are examined, but if the recently obtained Indian specimen is at all representative, some of them must prove constant. Discrepancies between the measurements of the skull of this specimen and those of the type are perhaps due to the fact that it is fully adult while the type is said to be a "young adult."

*Dacnomys wroughtoni* of Assam, as described, is even larger than *millardi* and, therefore, still further removed from *ingens*.

### ?*Bandicota* sp.

The skin of a dark grayish rat in the Delacour and Lowe collection from Chapa, Tonkin, is without skull and practically unidentifiable even as to genus. A possibility is relationship to *Bandicota savilei curtata* of Raheng, Siam, from the description of which it seems

to differ at least in smaller size and darker color, the tail in the dried skin measuring only 122 mm. and the hands and feet being wholly blackish.

**Bandicota nemorivaga** Hodgson. SMALLER BANDICOOT RAT.

*Mus (Rattus) nemorivagus* Hodgson, Jour. As. Soc. Beng., 5, p. 234, 1836 — Nepal.

K. R.—Phong Saly, L. 2.

One of these is an adult female of moderate size and the other a very large old male, the latter unfortunately without skull. The measurements of this male are: total length 552; tail 258; hind foot 55. It is, therefore, much larger than any *nemorivaga* previously recorded and equals the size of members of the *gigantea* series represented in Indo-China by *jabouillei*. Color and detailed cranial characters, however, indicate relationship to *nemorivaga* rather than *jabouillei*. The female is closely similar in size, color, and other respects to specimens of *nemorivaga* in the original series from Nepal. There is also substantial agreement with specimens of *nemorivaga* from Tengyueh, Yunnan. The form called *mordax* (Thomas, Jour. Bomb. Nat. Hist. Soc., 24, p. 642, 1916) from Chiangmai, northern Siam, is doubtless closely related or identical, but it is represented only by the type, an immature female which is insufficient to demonstrate its distinction from *nemorivaga*.

**Bandicota gigantea jabouillei** Thomas. JABOUILLE'S BANDICOOT RAT.

*Bandicota jabouillei* Thomas, Proc. Zool. Soc. Lond., p. 54, 1927—Tourane, Annam.

REC. 1925 29. Dakto, A. 1; Tourane, A. 1.

Not represented in recent collections.

**Apodemus speciosus orestes** Thomas. CHINESE WOOD MOUSE.

*Apodemus speciosus orestes* Thomas, Abstr. Proc. Zool. Soc. Lond., p. 49, 1911; Proc. Zool. Soc. Lond., p. 136, 1912 Mount Omei, Szechwan.

K.-R.—Szechwan: Hlalong 1; Itze 1; Muli 6.

On account of slightly darker color, these are referred to *orestes* rather than *peninsulae* to which they show close general resemblance.

**Apodemus agrarius chevrieri** Milne-Edwards.

*Mus chevrieri* Milne-Edwards, Rech. Hist. Nat. Mamm., p. 288, pl. 40, fig. 2, 1868-74—Mouping, Szechwan.

K.-R.—Szechwan: Meti Long 1; Muli 1; Nien Yuen Fu 1. Yunnan: Nguluko 19; 45 miles north of Likiang 1; Yungning 3.

This unstriped member of the *agrarius* series has such close external resemblance to *orestes* that identification of individual specimens is quite uncertain without recourse to the skulls. The absence of the small antero-external tubercle of the second upper molar is usually conclusive.

**Apodemus latronum** Thomas. BIG-EARED WOOD MOUSE.

*Apodemus speciosus latronum* Thomas, Abstr. Proc. Zool. Soc. Lond., p. 49, 1911; Proc. Zool. Soc. Lond., p. 137, 1912—Tatsienlu, Szechwan.

K.-R.—Szechwan: Chaulu 1; Chelo 2; Kulu 12; Wushi 21. Yunnan: Lutzulu, bend of Yangtze 3; 25 miles north of Likiang 1; 45 miles north of Likiang 2; Nguluko 10.

The large size and especially the large blackish ears of this mouse distinguish it readily from either *agrarius* and its races or *speciosus* so far as represented in Field Museum. That it grades into *speciosus* seems very doubtful and it is perhaps more probable that it will prove related to the large European species *epimelas* or *flavicollis*, neither of which is available to me as this is written. The skull is characterized by a large wide braincase, long flat nasals, and rather large cheek-teeth. In most specimens traces of a fourth outer tubercle on the first upper molar can be seen. Specimens from Yunnan average slightly smaller than those from Szechwan.

**Micromys minutus erythrotis** Blyth. HARVEST MOUSE.

*Mus erythrotis* Blyth, Jour. As. Soc. Beng., 24, p. 721, 1855—Cherrapunji, Khasia Hills, Assam.

D. & L. 1929 30. Chapa, T. 4.

These were received too late for direct comparison with Indian material and may be referred provisionally to *erythrotis*, the oldest name for any Asiatic *Micromys*. They are rather dark in color and the under parts are strongly washed with brownish Cinnamon, especially on the middle of the pectoral region.

**Hapalomys delacouri pasquieri** Thomas. PASQUIER'S TREE RAT.

*Hapalomys pasquieri* Thomas, Proc. Zool. Soc. Lond., p. 57, 1927—Xieng Kuang, Laos.

K.-R.—Phong Saly, L. 1.

REC. 1925-29.—Xieng Kuang, L. 1 (type).

A good adult male specimen makes it possible to redefine this form, which was based on a young example giving scarcely any indication of its true characters except as to the reduced size of the molars.

The color is essentially as in *delacouri*, possibly a little darker, with a slight suggestion of a dark eye-ring, a patch of dusky on the inner proximal half of the hind foot, and under parts which are light buff rather than white. The small, rounded ears are almost naked except for long sparse hairs which rise mainly from their margins, producing an unusual appearance.

The skull differs from that of *delacouri* in having a decidedly wider braincase, highly developed supraorbital ridges, short slender nasals, and a generally short and weak antorbital region. The molars are definitely smaller than in *delacouri* although there is some variation between the type of that form and another specimen from the type locality.

Measurements of an adult male from Phong Saly are: total length 292; tail 171; hind foot 22. Skull: greatest length 32; condylo-incisive length 29.7; zygomatic breadth 17.1; nasals 8.8; interorbital constriction 5.2; breadth of braincase 15.7; palatilar length 13.8; upper molar series 5.45; breadth upper premolar 1.85.

*H. delacouri*, described from Dakto, Annam, is not represented in the collection. *H. marmosa* from Hainan, of which the cranial characters are unknown, doubtless is closely allied.

### **Chiropodomys gliroides Blyth. PENCIL-TAILED TREE MOUSE.**

*Mus gliroides* Blyth, Jour. As. Soc. Beng., 24, p. 721, 1855 - Cherrapunji, Khasia Hills, Assam.

K. R. Muong Boum, T. 1; Muong Mo, T. 3; Muong Moun, T. 4; Phong Saly, L. 2.

REC. 1925 29. Dakto, A. 6.

A single specimen from the Jaintia Hills, Assam, now in the British Museum, appears to be the only modern one typically representing this species. Aside from its somewhat brighter color, especially about the head and the sides of the face, it is in substantial agreement with the small series from Tonkin and Laos.

A series in the British Museum from southern Tenasserim, characterized by rather large general size and relatively small audital bullae, indicates that a northern subspecies should be recognized, probably under the name *Chiropodomys gliroides peguensis*.



**Vandeleuria dumeticola scandens** subsp. nov. LONG-TAILED  
CLIMBING MOUSE.

*Type* from Muong Boum, Tonkin. No. 32,452 Field Museum of Natural History. Adult male. Collected March 22, 1929, by Russell W. Hendee. Orig. No. 5,330.

*Diagnosis.* Similar to *V. dumeticola*, but smaller; under parts tinged or washed with ochraceous instead of nearly pure white. Size about as in *V. sibylla*, but differing from that very small species in the shape of the braincase which is extremely inflated.

*Color.*—Upper parts, including ears and feet, Ochraceous Tawny; under parts creamy white lightly washed with ochraceous buff especially on the breast and interaxillary region; tail drabish, slightly paler below than above.

*Skull.*—General form as in *V. dumeticola*, but braincase even more inflated and interorbital region correspondingly shortened; infraorbital plate short, scarcely projecting anteriorly; nasals short and narrow; incisive foramina short; teeth small, scarcely exceeding those of *V. sibylla*.

*Measurements.*—Type: total length 153; tail 92; hind foot (c.u.) 17. Skull of type: greatest length 19.1; condylo-incisive length 17.1; nasals 6; interorbital constriction 3.2; breadth of braincase 10.1; palatal foramina 2.7; upper molar series 3.1.

*Remarks.*—In addition to the type, three specimens essentially like it have been examined in the British Museum. These are from Thai Nien, Tonkin, and Xieng Kuang, Laos, collected in 1924-25 by Herbert Stevens and Willoughby Lowe. Three of the four specimens have a marked wash of ochraceous on the under parts. The third is a nursing female in somewhat worn pelage in which less of this wash appears, but it is quite evidently a character distinguishing from *dumeticola* in which nothing of the kind appears in a considerable series.

For the present, this form may be regarded as a subspecies of *dumeticola* with which it agrees in the form of its skull. This is contrary to usual procedure for there is considerable possibility that it may be quite distinct. Series of *dumeticola* from Nepal through Assam to Upper Burma are quite uniform in size and the sudden diminution shown by this form in Tonkin leaves some doubt that intergradation exists. Until further specimens are obtained, however, its obvious relationship to *dumeticola* is best expressed by the sub-specific status.

With the possible exception of *V. sibylla*, this is the smallest member of the genus. The type of *sibylla* is in "spirit" and of little value for color characters, but its skull has a long narrow braincase, a wide and somewhat projecting infraorbital plate, and a thick rostrum, all indicating affinity to *oleracea* rather than to *dumeticola*.

***Eothenomys (Anteliomys) custos hintoni* subsp. nov. HINTON'S  
VOLL.**

*Type* from Wushi, southwest of Tatsienlu, Szechwan, China. Altitude 12,000 feet. No. 33,073 Field Museum of Natural History. Adult female. Collected May 15, 1929, by Herbert Stevens. Orig. No. 322.

*Diagnosis.*—Similar to *E. custos*, but slightly larger (hind foot 18–20) and with a longer tail, this being about two-thirds the length of the head and body. Skull rather small (condylo-basal length 25 or less). Dentition somewhat as in *E. c. tarquinius*, the last upper molar with four inner and four outer salient angles.

*Color.*—Practically as in *custos* and *chinensis*, but feet paler. Upper parts grayish washed heavily with Wood Brown medially, this in some cases extending to sides; fore and hind feet drabish white; tail dusky above and definitely lighter below; muzzle pale drabish brown.

*Skull.*—Slightly larger than in *custos*, but much smaller than in *chinensis*; braincase rather high and narrow; interorbital region relatively wider than in *chinensis*, but with similar slightly elevated temporal ridges; nasals short, exceeded by ascending premaxillae; palate without median spine; molar pattern practically as in *E. c. tarquinius* and as in some specimens of *custos* but differing from the former in greater confluence of triangles and from most of the latter as well as from *E. wardi* in lacking any tendency to the development of an incipient fourth inner salient angle in the first upper tooth and a third one in the second upper tooth; last molar with four inner and four outer angles (in some specimens of *custos* and *rubellus* there are four inner angles and in others there are five).

*Measurements.* Average of ten topotypes measured by the collector: total length 150.7 (147–158); tail 55.2 (51–59); hind foot 19.4 (19–20). Skull of type: condylo-basal length 24.8; zygomatic width 14.4; interorbital constriction 4.2; occipital width 11.4; nasals 7 x 3; diastema 7.6; diagonal length of audital bullae 6.4; upper molar series (crowns) 5.5.

*Remarks.*— In view of the number of named forms of *Eothenomys* "known only from the type locality" and the uncertainty as to the full maturity of individual specimens even when selected from considerable series, the conclusion that still another form should be named has been reached with some reluctance and only after a careful review of possible alternatives. A series of fifteen specimens is in hand, all from one locality and all of approximately the same age which seems to be that of maturity, although no very aged examples are included. On account of their relatively long tails, these were at first supposed to be allied to *chinensis*, from which they do not differ greatly in color, and the idea was entertained that they might stand in some connecting relation between *chinensis* and *A. wardi* of northwestern Yunnan, which appears more closely related to *chinensis* than to any other form. Owing to their small size, pale feet, etc., it was found quite impossible to refer them either to *chinensis* (*tarquinius*) or to *wardi*.

The real relationship of the new form appears to be with *E. custos* from which it is easily distinguished by its longer tail and its somewhat simplified molars. The dentition has some superficial resemblance to that of *E. c. tarquinius*, the last upper molar having four outer and four inner angles and the first and second molars showing no tendency to the development of fourth and third inner angles respectively. In the last molar, however, the third inner angle is usually confluent with the fourth outer, whereas in *tarquinius* the two are closed. In the fifteen specimens examined, two have the last upper molar with five inner angles as is commonly but not invariably the case in *E. custos*.

### ***Eothenomys* (*Antelionomys*) *custos rubellus* Allen.**

*Microtus* (*Antelionomys*) *custos rubellus* Allen, Am. Mus. Novit., No. 133, p. 5, 1924 Ssushan, Likiang Range, Yunnan.

K. R. Yunnan: near Lutzulu, bend of Yangtze River 5; Nguluko 1; 25 miles north of Likiang 1; 45 miles north of Likiang 1; 60 miles north of Likiang 1.

These agree in cranial characters with topotypes of *rubellus*, but several of them are very light in color, having been taken in spring instead of fall, probably bridging any supposed color difference between *custos* and *rubellus*.

### ***Eothenomys* *proditor* Hinton.**

*Eothenomys* *proditor* Hinton, Ann. Mag. Nat. Hist., (9), 11, p. 152, 1923 — Likiang Range, Yunnan.

K.-R. —Szechwan: Itze 2; Kulu 2. Yunnan: 25 miles north of Likiang 1; Nguluko 8.

Except for its slightly smaller size, there seems to be no external character to separate this species from *E. fidelis* which is found in the same region. The skulls also are remarkably similar in general conformation and there remains only the rather pronounced differences in the first and second upper molars, these having four and three inner triangles respectively in *fidelis* and three and two in *proditor*. In the last upper molars no constant difference is found. The first and second upper molars in *proditor*, therefore, are quite as in *Antelionomys* and the last molar is but slightly different from many specimens of *A. chinensis*. This makes the generic distinction of *Eothenomys* and *Antelionomys* very difficult and, with due deference to those who have devoted much study to microtines, I am inclined to treat them at most as subgenera.

#### ***Eothenomys melanogaster fidelis* Hinton.**

*Eothenomys fidelis* Hinton, Ann. Mag. Nat. Hist., (9), 11, p. 150, 1923 — Likiang Range, Yunnan.

K.-R.—Szechwan: Kulu 2; Muli 4. Yunnan: Nguluko 1.

In average size, these specimens do not equal the extremes given for *fidelis* and it is probable some of them should be regarded as furnishing the expected indication of intergradation with *melanogaster*. In any case, there is little reason to doubt that such intergradation will be found and the retention of *fidelis* as a distinct species seems inadvisable. The specimens from Kulu, which appear fully developed, are larger than in *melanogaster* but considerably smaller than in typical *fidelis*. The last upper molar, however, is quite as in *fidelis*, with four inner salient angles instead of the three found in *melanogaster*. There is much variation in color, one specimen being bright "reddish" throughout and another (collected March 30) being in process of changing pelage passing from a reddish brown coat to a much darker shade.

#### ***Eothenomys melanogaster confini* Hinton.**

*Eothenomys melanogaster confini* Hinton, Ann. Mag. Nat. Hist., (9), 11, p. 151, 1923—Kiuchiang, Salween Divide, Yunnan.

K.-R.—Chapa, T. 1.

D. & L. 1929-30.—Chapa, T. 8.

Microtines, not hitherto recorded from Indo-China, were obtained only at one locality, a single specimen being taken by Hendee at

Chapa and a series of eight by Delacour and Lowe at the same place. The range of dates is from Nov. '07 to Feb. 13 and the earlier specimens are darker, less "reddish," than the later ones. In color and in size of skulls, there is much resemblance to *M. m. columnus*, but the last upper molar in all cases has four salient inner angles. Among the skulls are several which nearly or quite reach the dimensions of the unique type of *M. m. muletus*. The arched form of this type, as a subspecific character, needs confirmation by additional specimens. A small series from Mucheng, Salween drainage, referred to *confini* by Allen, is uniformly smaller than the Tonkin series, perhaps indicating that the latter stand in a position intermediate between *confini* and *columnus*.

**Rhizomys pruinosus senex** Thomas. HOARY BAMBOO RAT.

*Rhizomys senex* Thomas, Ann. Mag. Nat. Hist., (8), 16, p. 313, Oct., 1915 near Mongtze, Yunnan.

K.-R. Muong Boum, T. 3; Muong Mo, T. 4; Muong Moun, T. 10; Pa Ham, T. 1; Phong Saly, L. 8.

D. & L. 1929-30. Chapa, T. 4; Hoi Xuan, A. 1; Huê, A. 1; Ke Saule, A. 2; Lung Lunh, A. 1; Pakha, T. 2.

REC. 1925-29.—Backan, T. 10; Bao Ha, T. 6; Dakto, A. 2; Ngai Tio, T. 18; Nganson, T. 7; Napé, L. 6; Xieng Kuang, L. 3.

WULSIN 1924.—Phong Saly, L. 1.

Tonkin specimens are quite the same as those from southeastern Yunnan whence this form was described. Since it differs from typical *pruinosus* of Assam only in somewhat increased size, its close relationship is best indicated by the subspecific status. The same is doubtless true of *latouchi* and *pannosus*.

**Nyctocleptes sumatrensis cinereus** McClelland. YELLOW-CHEEKED BAMBOO RAT.

*Rhizomys cinereus* McClelland, Calc. Jour. Nat. Hist., 2, p. 456, 1842—Tenasserim.

*Nyctocleptes cinereus* Thomas, Ann. Mag. Nat. Hist., (8), 16, p. 57, 1915.

K.-R.—Ba Nam Nhung, T. 2; Muong Mo, T. 2; Muong Moun, T. 2; Phong Saly, L. 1.

D. & L. 1929-30.—Hoi Xuan, A. 3.

DEL. 1931-32.—Banphone, L. 1; Thateng, L. 10.

Among these specimens are some, perhaps a majority, that are lighter in color than available examples from Tenasserim and Siam, but it is evident that variation due to age and pelage is considerable.

Specimens from the northern Shan States of Burma, doubtless representing the *erythrogenys* of Anderson, are much larger than any others examined, but the recognition of a separate form in that region is dubious. Southern specimens in general seem to be somewhat smaller than northern and to have the ferruginous of the head slightly deeper in shade.

Thomas (l.c.) proposed *Nyctocleptes* as a genus to include the nominal species *sumatrensis*, *cinereus*, and *insularis* which are so closely related that the genus may be considered as practically monotypic. Its distinction from *Rhizomys* rests mainly on characters of the plantar pads and mammae the significance of which may be a matter of opinion.

Although now represented by specimens from a number of localities, this strikingly colored bamboo rat appears not to have been recorded previously from Indo-China.

***Hystrix (Acanthion) brachyurus subcristatus* Swinhoe. SHORT-TAILED PORCUPINE.**

*Hystrix subcristatus* Swinhoe, Proc. Zool. Soc. Lond., p. 638, 1870—Foochow, Fukien.

K.-R.—Muong Moun, T. 1; Phouc Mon, Quangtri, A. 1.  
REC. 1925-29.—Backan, T. 1; Huê, A. 1.

The two specimens in hand are not fully mature and no direct comparisons have been made with material from other localities, so their reference to *subcristatus* is provisional. Apparently *brachyurus* of Malaysia, *klossi* of Tenasserim and Siam, *papae* of Hainan, and *subcristatus* of Fukien differ from each other, if at all, mainly in size, and the identification of individual specimens from intermediate localities is fairly hopeless.

Lönnberg's contention (Archiv. f. Zool., 15, No. 18, 1923) that no sharp lines can be drawn in generic distinction of *Hystrix* and *Acanthion* seems well grounded and based on the examination of a large and varied number of species. The outward resemblance of certain species of *Acanthion* to *Hystrix* extends even to color and markings and with a wide variation in cranial characters, all of a relative nature, generic separation has little or no advantage.

The relationship of *Atherurus* to *Acanthion* is not very distant. A skull in Field Museum representing *Thecurus*(?) *crassispinis* from Borneo, which is externally much like *Acanthion*, has well-rooted molars and general similarity to *Atherurus*.

**Atherurus macrourus stevensi** Thomas. BRUSH-TAILED PORCUPINE.

*Atherurus stevensi* Thomas, Proc. Zool. Soc. Lond., p. 505, July 21, 1925—  
Ngai Tio, Tonkin.

*Atherurus macrourus stevensi* G. M. Allen, Am. Mus. Novit., No. 290, p. 1,  
Oct. 24, 1927.

K.-R.—Lai Chau, T. 1; Muong Moun, T. 1.

D. & L. 1929-30.—Chapa, T. 9.

DEL. 1931-32.—Thateng, L. 2.

REC. 1925-29.—Huê, A. 2; Napé, L. 1; Ngai Tio, T. 1 (type);  
Xiang Kuang, L. 1.

The specimen from Muong Moun has the under parts largely whitish and the "wool hairs," although not abundant, are whitish as described for the type of *stevensi*. The other specimens are darker with the white of the under parts confined mainly to the median line. Specimens from Laos and Annam have been referred by Thomas to *macrourus* and it is evident that the characters of *stevensi* are not yet well understood.

**Lepus comus** G. M. Allen. GRAY-TAILED HARE.

*Lepus comus* G. M. Allen, Am. Mus. Novit., No. 284, p. 9, Sept., 1927—  
Tengyueh, Yunnan.

K.-R.—Nguluko, Yunnan 1; Zumpa, near Kulu, Szechwan 1.

Two specimens of this interesting hare are in the collection. Their gray tails, gray rumps, and long hind feet leave no doubt of their identity although the dimensions of their skulls do not quite equal those given for the type.

**Lepus comus grahami** A. B. Howell.

*Lepus grahami* A. B. Howell, Proc. Biol. Soc. Wash., 41, p. 143, Oct. 15, 1928—  
Ulongkong, Szechwan.

K.-R.—Ulongkong, Szechwan 1.

This specimen, a topotype of *grahami*, shows some indications of the slight color characters mentioned in the original description. Like the type of *grahami*, it was taken in July, while all available specimens of typical *comus* bear dates of March or April. It is not unlikely, therefore, that the differences will prove to be seasonal; but until further specimens are examined the name should perhaps be given the benefit of the doubt.

***Lepus peguensis siamensis* Bonhote. SIAMESE HARE.**

*Lepus siamensis* Bonhote, Proc. Zool. Soc. Lond., p. 40, 1902—Chiengmai, Siam.

*Lepus peguensis siamensis* Chasen and Kloss, Jour. Nat. Hist. Soc. Siam, Suppl., 8, p. 76, 1930.

WULSIN 1924.—Vientiane, L. 2.

DEL. 1931–32.—Pakse, L. 2; Thateng, L. 1.

Two somewhat imperfect specimens in the small collection made by F. R. Wulsin for the United States National Museum agree closely with descriptions of this form which has been recorded from various localities in northern and central Siam. They were taken in July and are quite richly colored. Three specimens from southern Laos are in complete agreement with them.

***Lepus peguensis vassali* Thomas.**

*Lepus vassali* Thomas, Ann. Mag. Nat. Hist., (7), 17, p. 425, April, 1906—Nhatrang, Annam.

K.-R.—Phouc Mon, Quangtri, A. 1.

REC. 1925–29.—An Binh, C.C. 1; Djiring, A. 2; Huê, A. 2; Kompong Thom, C. 3.

The distinction of this form from *siamensis* is not well established. The present specimen, as compared with those from Vientiane referred above to *siamensis*, is paler on the head, back, and sides and the black on the ears is reduced. The date, however, is January and some of this difference may be seasonal. The size is slightly smaller and the skull is shorter with somewhat broader nasals. Apparently there is little or no distinction in the amount of white on the belly, although this has been mentioned by Thomas (Proc. Zool. Soc. Lond., p. 58, 1927).

***Ochotona thibetana zappeyi* Thomas. ZAPPEY'S PIKA.**

*Ochotona zappeyi* Thomas, Ann. Mag. Nat. Hist., (9), 9, p. 192, Feb., 1922—Shuowlow, northwest of Tatsienlu, Szechwan.

K.-R.—Big bend of Yangtze, near Lutzulu, Yunnan 1; Kulu, Szechwan 8.

Specimens from Szechwan and Yunnan south and west of Tatsienlu appear referable to this form which is barely recognizable on the basis of slight cranial characters. Specimens in the British Museum labeled *thibetana* are mostly from the Mekong-Yangtze



Divide and the Likiang Range, both in Yunnan. The type of *thibetana* came from Mouping and no subsequent specimens from that exact region have yet been taken. In the British Museum, however, is a specimen from "Twenty-three miles southeast of Tatsienlu" which has been compared with the type by Thomas and has on its label the following notation: "May be accepted as typical of *thibetana*. Skull precisely agrees with that of type sent for comparison from Paris. O. T. 12/21." Comparison of this skull with one of the present series from Kulu (which agrees essentially with a topotype of *zappeyi*) shows it to have a somewhat broader and deeper braincase, a flat, smooth interorbital region and slightly larger audital bullae. It may be assumed, therefore, that these characters distinguish *thibetana* from *zappeyi*, one being found eastward from Tatsienlu and the other westward and southwestward.

The small pikas of western China obviously fall into two specific groups typified by *thibetana* and *cansa*. The application of various binomial names to different forms of these two groups is confusing and serves to create the impression of much greater differentiation than really exists. Forms which seem so close to *thibetana* that subspecific rank is clearly indicated are *O. t. sacra* (which, if recognizable, is doubtless confined to Mount Omei), *O. t. syrinx* (although compared with *cansa* in original description), *O. t. morosa* (although actually linked with *cansa* as a subspecies), and *O. t. sikimaria* (the skull of which is practically identical with that of *zappeyi*). *O. forresti*, which has been stated as allied to *thibetana*, is probably more closely related to *roylei*.

***Ochotona cansa stevensi* subsp. nov.**

*Type* from Wushi, southwest of Tatsienlu, Szechwan, China. No. 33,098 Field Museum of Natural History. Adult male. Collected May 14, 1929, by Herbert Stevens. Orig. No. 317.

*Diagnosis*.—Similar to *O. cansa*, but skull longer, more slender, and less arched; audital bullae considerably smaller.

*Color*.—Practically as in *O. cansa*, the under parts, at least in winter, with a sharply defined breast stripe of fulvous.

*Skull*.—Narrow and elongate; nasals of moderate width; audital bullae small.

*Measurements*.—Average of ten adults measured by the collector: total length 146.3 (140–152); hind foot (s.u.) 26 (25–27); ear 18.5 (17–20). Skull of type: greatest length 35; condylo-incisive length

33.4; zygomatic width 15.9; nasals 11 x 4.3; interorbital constriction 3.6; width of braincase 12.7; palatal foramina 9 x 3.3; diagonal length audital bulla 9; upper cheek-teeth (alveoli) 6.6.

*Remarks.*—This form, which is the southernmost of the *cansa* group, is represented by a large series of thirty-eight from Wushi, two from Chaulu, which is between Wushi and Tatsienlu, and by a single specimen from Kwanchai, some distance northwest of Tatsienlu. It differs from typical *cansa* mainly in cranial characters among which the smaller audital bullae are most pronounced. Although the bullae are smaller than in *cansa*, they are practically the same size as in *O. c. sorella*, the unique type of which has been compared with that of *stevensi*. In *sorella*, however, the nasals are longer and narrower and the braincase slightly wider. Since the range of *cansa* intervenes between that of *sorella* and *stevensi*, it is altogether probable that further specimens of *sorella* will substantiate these apparently slight characters. Two immature specimens in Field Museum from Samsa Drok, Thibet, collected by R. B. Ekvall of Taochow, Kansu, have very small bullae but are too imperfect for exact determination.

### ***Sus cristatus jubatus* Miller. WILD BOAR.**

*Sus jubatus* Miller, Proc. U. S. Nat. Mus., 30, p. 745, 1906—Trang, lower Siam.

K.-R.—Lao Fou Chai, L. 1 (skull); Phouc Mon, Quangtri, A. 1 (skin and skull).

REC. 1925-29.—Djiring, A. 2; Phuquoc Island, C. 1.

The larger of these is a male with its last molar barely erupted. The upper length of the skull is 380 and the toothrow 115. Since these are almost exactly the measurements given for the type of *jubatus*, that name is used; but material in hand is too limited for any positive conclusions.

### ***Tragulus kanchil affinis* Gray. MOUSE DEER.**

*Tragulus affinis* Gray, Proc. Zool. Soc. Lond., p. 138, 1861—Cambodia.

*Tragulus kanchil pierreii* Bonhote, Ann. Mag. Nat. Hist., (7), 11, p. 293, 1903—near Bien Hoa, Cochin China.

*Tragulus kanchil affinis* Bonhote, Proc. Zool. Soc. Lond., p. 11, 1907—*pierreii* = *affinis*; Kloss, Proc. Zool. Soc. Lond., p. 63, 1916.

K.-R.—Tha Ngon, Vientiane, L. 1 (skull).

D. & L. 1929-30.—Hoi Xuan, A. 1; Huê, A. 2; Quangtri, A. 1.

DEL. 1931-32.—Thateng, L. 3.

REC. 1925-29.—Huê, A. 1; Kontoum, A. 2; Napé, L. 1; Phuqui, A. 1; Quangtri, A. 1; Thua Lua, A. 1.

Mouse deer from Indo-China are somewhat duller in color than in *ravus* and *affinis*. The heads, especially, are more grayish or brownish and more contrasted with the body. The dark nuchal area is rather well marked. Season may account for part of this. Material representing typical *affinis* is as yet rather unsatisfactory and it is not unlikely that it will be found to stand in directly intermediate position between *ravus* and the Indo-Chinese specimens. The skull from Vientiane does not reach the published dimensions of *williamsoni* (Kloss, Jour. Nat. Hist. Soc. Siam, 2, p. 88, 1916) but it is somewhat larger than one from Annam and its identification is doubtful.

### **Muntiacus muntjak vaginalis** Boddaert. BARKING DEER.

*Cervus vaginalis* Boddaert, Elench. Anim., 1, p. 136, 1785—Bengal, India.

K.-R.—Can Ho, T. 1; Muong Yo, L. 1; Phong Saly, L. 1.

D. & L. 1929-30.—Chapa, T. 2.

REC. 1925-29.—Backan, T. 4.

These are slightly paler than specimens of *vaginalis* from Darjeeling and Assam. Perhaps, therefore, they may be considered somewhat intermediate between *vaginalis* and *curvostylis* of Siam. Aside from general shade of color, the principal difference between *vaginalis* and *curvostylis* seems to be in the color of the legs, *vaginalis* having them brown in front for their whole length while *curvostylis* has the brown only on the lower part of the legs. In this character our specimens agree more closely with *vaginalis*. The front legs are brown anteriorly and ochraceous behind. The hind legs below the hock are brownish all around in two specimens while in the third there is a division much as in the front legs.

A specimen in the British Museum from Backan, Tonkin, is slightly brighter than others from higher elevations and has the brown of the fore legs much narrowed in its upper part. On the hind legs also the brown is reduced and confined to the front side. This specimen may also be interpreted as intermediate, in this case perhaps tending toward *M. m. nigripes*. Specimens from Chapa are of similar character.

**Muntiacus muntjak annamensis** Kloss.

*Muntiacus muntjak annamensis* Kloss, Ann. Mag. Nat. Hist., (10), 1, p. 399, March, 1928—Langbian Peak, Annam.

K.-R.—“Saigon,” 3.

D. & L. 1929–30.—Thua Thien, A. 1.

DEL. 1931–32.—Thateng, L. 2.

REC. 1925–29.—Djiring, A. 1; Kontoum, A. 3; Tay Ninh, C.C. 2.

Three specimens received from Saigon are in the collection and probably came from the Lagna River or Flat Rock River near the base of the plateau northeast of Saigon. One is an adult male received from F. J. Defosse and the others are younger animals collected by Theodore Roosevelt.

In general body color these differ little from Tonkin specimens of *vaginalis*, but the legs and feet are noticeably different. Whereas the lower half of the legs is nearly uniform brownish in front in *vaginalis*, it is “reddish” with a median distal marking of blackish and a whitish spot above the cleft of the hoofs in *annamensis*. The pasterns behind and the area surrounding the dew claws also are blackish. Among specimens in the British Museum are several heretofore assigned to *curvostylis* which seem more nearly to agree with *annamensis*. By inference from the original description of *annamensis* it appears that typical *curvostylis* from southwestern Siam has the legs “dark brown below anteriorly.”

**Muntiacus muntjak nigripes** G. M. Allen.

*Muntiacus muntjak nigripes* G. M. Allen, Am. Mus. Novit., No. 430, p. 11, Sept. 18, 1930—Nodda, Hainan.

D. & L. 1929–30.—Hoi Xuan, A. 2.

Two fine males from the lowlands near the coast of northern Annam agree quite closely in color with the description of this form recently named from specimens taken on Hainan. The very dark legs and feet are in striking contrast to the tawny body color. The dark marking extends to the shoulder in front and to the “knee” on the hind legs. On the lower part of the legs, especially in front, there are scattered white hairs.

In size these mainland specimens are larger than the dimensions given for the type of *nigripes* from Hainan. This is, perhaps, only to be regarded as evidence of gradation toward *vaginalis*, and at least until much more material is examined, separation of another mainland form appears inadvisable. Specimens from Chapa, Tonkin,

which have been referred to *vaginalis*, are obviously intermediate in color.

The skulls of the specimens from Hoi Xuan have a condylo-basal length of about 200 mm., thus being about equal to that in *vaginalis*, but the tooththrow is short, measuring only 61–62 as in *nigripes*.

**Muntiacus rooseveltorum** sp. nov. ROOSEVELT'S BARKING DEER.

*Type* from Muong Yo, Laos. Altitude 2,300 feet. No. 31,783 Field Museum of Natural History. Subadult male. Collected May 16, 1929, by Harold J. Coolidge, Jr. Orig. No. 89.

*Diagnosis*.—Characterized primarily by the great development of the mental glands (fig. 30) which are 1.25 inches in length on each side of the jaw and covered with stiff, close-standing, brownish hair 10 mm. long. Size intermediate between *M. muntjak* and *M. reevesi*; general color brownish, but the hairs annulated, producing a finely speckled effect over the entire body as in *M. reevesi*; skull with a relatively small preorbital pit as in *M. muntjak*, its anterior boundary about reaching the plane of the front of the second premolar; ascending branches of premaxillae separated from the nasals by a hooked process of the maxillary; nasals long and with only slight lateral expansion.

*Color*.—Similar in general to that of *M. reevesi*, but body with a more "reddish" tone and sides of face and antorbital region to rhinarium more brownish; body color approaching the Auburn of Ridgway, the hairs everywhere finely annulated and on close examination appearing minutely speckled; top of head, cheeks, and base of ears bright Ochraceous Tawny; tail with a narrow dorsal line approximately like the body color; under side of tail broadly white; under parts more grayish than upper parts, becoming darker, almost Fuscous, on middle of chest; fore legs and lower scapular region Mummy Brown, the hind side of the legs thinly and narrowly lighter; hind legs Mummy Brown to the hocks and thence halfway to the base of the tail; throat white; inguinal region white and a narrow, ochraceous-bordered white line extending down the inside of the hind leg to a point opposite the hock; a spot on chin between mental glands blackish brown; glands drabish brown, the hairs paler basally.

*Skull*.—Intermediate in size between *M. reevesi* and *M. muntjak vaginalis* (tooththrow 58.6); preorbital pit as in the *muntjak* series, relatively small, its anterior border about even with the front of the second premolar; upper part of lacrymal above and in front of pit

expanded into a nearly vertical plate 9 mm. in width; maxillo-lacrymal vacuity short and broad as in *muntjak*, not long and narrow as in *reevesi*; ascending premaxillae separated from nasals as in *reevesi*, not fully meeting nasals as in *muntjak*; nasals long and wider anteriorly than in either *muntjak* or *reevesi* and with only slight lateral expansion into maxillo-lacrymal vacuity, in this last respect being rather more like *reevesi*.

*Measurements.*—Collector's measurements of type: total length 1,024; tail 136; hind foot 349. Skull of type and specimens of *reevesi* and *vaginalis*:<sup>1</sup> greatest length 188, 171, 213; condylo-basal length 173, —, 200; zygomatic breadth 76, 70, 89.5; occiput to back of nasals

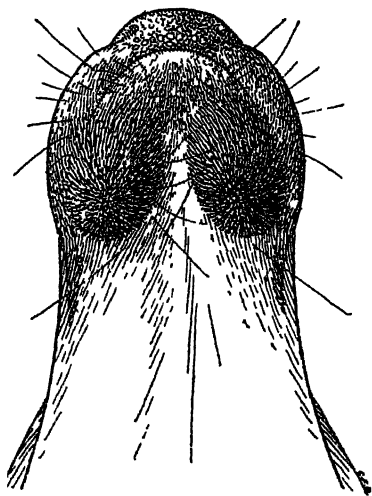


FIG. 30. Muzzle of *Muntiacus reevesi* showing mental glands.

114.5, 105.2, —; length of nasals 55.8, 48.9, 50.8; length of palate from gnathion 113.2, —, 129; upper toothrow 58.6, 50.5, 68.

*Remarks.*—A diagnostic character of this species and a feature of very great interest are the pair of highly developed glandular brushes on either side of the chin. Although all muntjaks appear to have at least traces of such glands, they are usually so small and inconspicuous that heretofore they have not been noticed. So far as known, they do not occur in other ungulates and no observations in regard to them in the living animal are available. In the dry specimen they appear quite clean, dry, and free from any odor or secretion, but that they are outgrowths from a glandular base can

<sup>1</sup>The figures in second position are those of the type of *reevesi* and those in third position of a specimen of *vaginalis* from Phong Saly, Laos.

scarcely be doubted. They are oblong in shape and measure about 33 mm. x 22 mm. The hairs are tubular, very stiff and upstanding and their pointed tips are slightly curved. Depending from them are six to eight long, soft, exerted hairs about 30 mm. in length and entirely similar to others which are scattered on the sides of the nose. The brownish color of these tufts is in sharp contrast to the white and ochraceous of the throat and face, so they are very conspicuous. Their position naturally suggests that they may serve to distribute scent as the animal feeds, but at present this can be no more than an assumption.

In determining the relationships of this animal, the entire *muntjak* group has been somewhat cursorily reviewed. Aside from the very large and quite distinct species *crinifrons* and the very little known *feae* with its blackish color and supposed absence of frontal glands, all the described forms appear to fall into one or the other of two well-defined groups. These are represented by the names *M. muntjak* and *M. reevesi*. In Lydekker's Catalogue of Ungulates all the forms of the first series have been regarded as subspecies of *M. muntjak*, as it seems to me quite properly. But in the other series, several supposed distinct species are recognized upon rather scant basis. If *M. lacrymans* and *M. sinensis* had been included among the subspecies of *reevesi*, it would have been more consistent and more conducive to a clear understanding of the actual relationships. This has been commented upon by A. B. Howell (Proc. U. S. Nat. Mus., 75, p. 75, 1929) and G. M. Allen (Am. Mus. Novit., No. 430, p. 12, 1930), the latter being disposed to reduce all the supposed forms of *reevesi* to synonymy.

As species, *M. muntjak* and *M. reevesi* in all their varieties differ not only in size and color but in important and unmistakable cranial characters. The cranial differences are mainly connected with the much larger relative size of the preorbital gland in *reevesi*. In the present species, *rooseveltorum*, there is a curious combination of these cranial characters of *muntjak* and *reevesi* which makes it difficult to be certain as to which it has greatest affinity. That it is very distinct from both seems amply evidenced by the extraordinary mental glands, but it shares one set of cranial characters with *muntjak* and another with *reevesi*. Further specimens will be of the highest interest.

### **Cervus eldi siamensis** Lydekker. THAMENG DEER.

*Cervus eldi siamensis* Lydekker, Cat. Ungul. Brit. Mus., 4, p. 104, 1915—southern Siam.

One skull bearing a fine pair of antlers is a part of the collection shipped from Saigon by Theodore Roosevelt.

***Cervus porcinus annamiticus* Heude. HOG DEER.**

*Hyelaphus annamiticus* Heude, Mem. Hist. Emp. Chinois, 2, p. 50, 1888—Annam.

K.-R.—Lagna River, C.C. 3.

Three adults, collected May 19 by Theodore Roosevelt and C. Suydam Cutting, bear out the characters assigned to this form and indicate that it is quite well marked. As compared with Indian hog deer they are larger, more richly colored, and in summer pelage unspotted. A male, which is in very glossy coat, appears uniformly colored in direct view but oblique reflections reveal evidences of a spotted pattern. The animal is reported to be abundant, although recorded specimens preserved in museums are few.

***Rusa unicolor equinus* Cuvier. EASTERN SAMBUR DEER.**

*Cervus equinus* Cuvier, Oss. Foss., ed. 2, 4, p. 45, pl. 5, figs. 37, 38, 1823—Sumatra.

K.-R.—Boun Tai, L. 5 (horns only); Flat Rock River, C.C. 1.  
WULSIN 1924.—Makai, near Tha Khek, L. 2.

REC. 1925-29.—Djiring, A. 2.

Following Lydekker, the samburs of southern Indo-China may be referred for the present to the form originally described from Sumatra. The antlers examined agree in having the beams very heavy at the base and the spread is much less than usual in heads from India and Ceylon. A good pair measures 790 mm. (31 in.) in length of beam; the circumference above the burr is 190 (7.5 in.).

***Rusa unicolor dejeani* Pousargues. NORTHERN SAMBUR DEER.**

*Rusa dejeani* Pousargues, Bull. Mus. Hist. Nat., Paris, 2, p. 12, 1896—Szechwan.

K.-R.—Chiulung (about lat. 29° 15' N.), Szechwan 1.

A female in handsome coat (February 21) was shot by Theodore Roosevelt in northwestern Szechwan a few days' march southwest of Tatsienlu. Its color is very rich, dark brown with a broad line of still darker, almost blackish, down the middle of the back, and a wholly black, very bushy tail. Toward the hind quarters there is a very heavy suffusion of ochraceous. The legs are broadly brownish fawn in front and white behind. The hairs of the end of the tail reach a length slightly exceeding 6 in., those on the side about 4 in.

A pair of antlers without label is in the collection made by Stevens in western China. These measure 22 inches in length of beam. Two



specimens have been recorded recently (1930) by G. M. Allen from Yunnan and, although the characteristics of the race *dejeani* are still uncertain, it is evident the animals regularly range throughout western Yunnan and Szechwan. The Roosevelts, in notes published with the popular account of their trip, make the following statement: "Sambhur have a very wide range, and from the time we left Bhamo until we reached Ningyuan we were rarely out of sambhur country. We found sambhur signs at altitudes varying from four to fourteen thousand feet. Many of the horns we saw were both long and exceptionally massive."

***Pseudois nayaur szechuanensis* Rothschild. BURRHILL SHEEP.**

*Pseudois nuhoor szechuanensis* Rothschild, Ann. Mag. Nat. Hist., (9), 10, p. 231, Aug., 1922—Szechwan, China.

*Pseudois nayaur caesia* A. B. Howell, Proc. Biol. Soc. Wash., 41, p. 118, 1928—Minshan Range, Kansu, China.

K.-R.—Tsung Gu, east of Tatsienlu, Szechwan 3.

Two adult males and a younger male, all shot by Theodore Roosevelt, are in the collection. The horns measure about 25 inches in length and 12.5 inches in circumference at base. The skins are very dark in color, but the lateral stripe is not very widely interrupted. The white on the knees is reduced to a small spot margined with blackish or represented only by a few white hairs. It is fairly evident, therefore, that the northern race is considerably darker than the typical one.

Notes published by the Roosevelts include the following: "Burriel or blue sheep we first heard of when we were leaving the Muli territory. They are known locally as *pan yang*. We saw heads and skins, and were told that if we wished to trek from a day to two days away from the trail we would find them plentiful. They live at about fourteen thousand feet elevation. Besides those shot two days north of Tatsienlu, we heard of them near Muping. They should also live in the mountains near Yehli, but there we saw neither hide nor horn."

The original description of this form was based on a mounted specimen from Szechwan and a skull from Shensi, both of which were mentioned as types. Applying the principle of page priority and considering the name chosen, the mounted specimen from Szechwan doubtless should be taken as the unique type. A later name *caesia* is now on the books, applied to specimens from Kansu which lies between Shensi and Szechwan. This emphasizes the need

for an exact type locality even though there may prove to be no recognizable differences between the animals of Szechwan, Kansu and Shensi. The name *caesia* apparently was proposed without knowledge of the earlier *szechuanensis* and may be regarded as a synonym.

**Capricornis sumatraensis milne-edwardsi** David. SEROW.

*Capricornis milne-edwardsi* David, Nouv. Arch. Mus. Hist. Nat., Paris, 5, Bull., p. 10, 1869—Mouping, Szechwan.

K.-R.—Mount Gibboh, between Yungning and Muli, Szechwan 1; "Szechwan," 1 (skull).

The skin of a subadult male shot by Kermit Roosevelt in western Szechwan is richly colored with the lower legs Ochraceous Tawny and the side of the muzzle has the "tan-colored" spot regarded by Allen (Am. Mus. Novit., No. 410, p. 5, 1930) as characteristic of this form.

A skull obtained by Stevens is without exact locality. It is quite large, measuring 320 mm. in occipito-nasal length; zygomatic width 123; tooththrow 96.5; horn over front curve 205 ( $8\frac{1}{8}$  inches).

**Capricornis sumatraensis maritimus** Heude. SEROW.

*Capricornis maritimus* Heude, Mem. Hist. Emp. Chinois, 2, p. 4, note, 1888; *ibid.*, p. 226, 1894—Tonkin.

D. & L. 1929-30.—Ninh Binh, T. 2.

REC. 1925-29.—Langson, T. 1; Nong-bat-koo, L. 3 (frontlets); Than Hoa, A. 1; Vinh, A. 1.

One of these specimens which is in hand is subadult, but apparently represents a form of relatively small size and dark color. The head and body are mainly blackish with the hairs whitish at the base. The lower legs and rump are tawny and there are light maxillary stripes of mixed tawny and whitish. There are no tawny spots on the sides of the face. The teeth, so far as comparable in the specimens examined, are smaller than in other recognized forms.

Of the several names given by Heude to serows from Tonkin, *maritimus* appears to be the earliest and its use is perhaps justified even though the exact status of the form has not been worked out.

**Bos (Bibos) banteng** subsp. BANTING OX.

K.-R.—Flat Rock River, C.C. 2; Lagna River, C.C. 1.

WULSIN 1924.—Lai Chau, T. 1.

Three fine specimens, all females, were obtained by Theodore Roosevelt in southern Annam. A partly grown calf from Laos is in the Wulsin collection.

The name *laosiensis* (Heude, Mem. Hist. Emp. Chinois, 5, p. 3, 1901) is perhaps applicable to these specimens. In one of the cows above mentioned, the horns swing upward and inward to such an extent that the tips cross each other.

**Bos (Bubalus) bubalis subsp. WATER BUFFALO.**

K.-R.—Lagna River, C.C. 3.

Two males and a female collected by Theodore Roosevelt and C. Suydam Cutting have furnished the material for a mounted group in Field Museum. They stand about 4.5 feet at the shoulder, the body color is slaty or grayish rather than black, and the lower legs are pale. Uncertainty apparently exists as to whether or not the water buffalo of this region are feral. At least their exact classification without other material for comparison is quite hopeless.

**Bos (Bibos) gaurus readi Lydekker. GAUR OX.**

*Bos gaurus readi* Lydekker, Zoologist, (4), 7, p. 266, 1903—Burma.

K.-R.—Flat Rock River, C.C. 1.

Besides a fine male collected by Theodore Roosevelt, there are also in Field Museum, from the same region, a male collected by F. J. Defosse, two females collected and presented by C. Rydell, and a very large male and a small calf collected and presented by G. F. Ryan and George G. Carey, Jr.

Although the gaur is common and well known to sportsmen visiting the southern end of the plateaus of Annam, its occurrence there has received little mention in zoological literature. Blanford in the Mammals of India (1891, p. 485) says: "The eastern range of this species is not clearly known except that it is said to extend to Siam and, I believe, to Cochin China." Kloss, in writing on mammals from Siam, says: "Practically all Siamese specimens have been obtained in the north or west." Lydekker's Catalogue of Ungulates records no eastern specimens.

In the absence of comparative material, the name of the Burmese race has been arbitrarily applied to the specimens at hand.

**Manis pentadactyla subsp. PANGOLIN.**

K.-R.—Muong Tia, T. 1; Nam He, T. 1 (flat skin only); Phong Saly, L. 2.

These are somewhat larger than *M. p. dalmanni* of southeastern China as defined by G. M. Allen (Am. Mus. Novit., No. 429, p. 6, 1930) and perhaps are nearer to *M. p. pusilla* of Hainan of which no specimens are in hand. The largest has the following dimensions taken by the collector: total length 718; tail 270; hind foot 71. The skull has a condylo-basal length of 85, whereas Allen states that Fukien skulls average 74 and Hainan skulls 82. The scales around the body are uniformly in series of 13 while the number in the Burmese form *aurita* is said to be 15-18.

***Paramanis javanica* Desmarest. PANGOLIN.**

*Manis javanica* Desmarest, Mamm., p. 377, 1822—Java.

DEL. 1931-32.—Thateng, L. 1.

REC. 1925-29.—Kontoum, A. 2; Tay Ninh, C.C. 1.



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BIRDS OF WESTERN CHINA OBTAINED BY  
THE KELLEY-ROOSEVELTS EXPEDITION

BY

OUTRAM BANGS

LATE CURATOR OF BIRDS, MUSEUM OF COMPARATIVE ZOOLOGY

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WILFRED H. OSGOOD

CURATOR, DEPARTMENT OF ZOOLOGY

EDITOR



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# BIRDS OF WESTERN CHINA OBTAINED BY THE KELLEY-ROOSEVELTS EXPEDITION

BY OUTRAM BANGS\*

The following account, which is little more than a purely nominal list, covers the birds collected in Yunnan and Szechwan by Herbert Stevens while on the William V. Kelley-Roosevelts Asiatic Expedition of Field Museum. This expedition made other collections of birds, mainly in Indo-China, which have formed the subject of a separate report (antea, pp. 33-119, June 1931). Meanwhile, the authorities of the Museum have kindly placed in my hands for identification the present collection from a different region. It numbers some 1,150 specimens, all taken by Stevens.

The region covered could not today be expected to reveal much in the way of new forms or of striking additions to its fauna; it is now pretty well known and has been thoroughly worked by many experienced collectors. Stevens, however, did secure a number of interesting species and added some records both to Yunnan and Szechwan.

At the meeting of the British Ornithological Club held in March 1930, Stevens gave a talk, mentioning by name some of the rarer birds that he secured or saw. This was published in the Bulletin of the British Ornithological Club, 50, p. 46, March 1930.

Early in the journey, the Roosevelts and C. Suydam Cutting went rapidly north on their successful hunt for the Giant Panda (Natural History, January-February 1930, pp. 3-16), leaving Stevens to follow slowly, with more time in which to collect. Besides birds, he made collections of mammals, insects, fishes, reptiles, amphibians and plants and brought his part of the expedition safely through the dangers and inconveniences of travel today in central China.

The route traversed by Stevens, roughly speaking, is as follows: Starting in northwestern Yunnan in January 1929, he collected at Ming-shih, Shang-kuan, Nguluko, Ao-wah and Yung-ning, and of course at intermediate places when camped or while traveling through. On March 25, he crossed into Szechwan and from then until well into May collected in succession at Muli, Ku-lu, Baurong and Wu-shi; from here he continued north through Tatsienlu into Mouping, going somewhat north of Mouping and then coming south again in

\* As this paper is passing through the press, the sad news is received of the author's death at Cambridge, Massachusetts, September 22, 1932.—Ed.



middle Szechwan, collecting last of all at Sui-fu in extreme south-central Szechwan where his field work ended October 18, 1929.

In identifying the species in the collection I have had for comparison, in addition to the now nearly complete set of Chinese birds in the Museum of Comparative Zoology, a few skins borrowed from the United States National Museum, for the use of which I am greatly indebted to the very prompt response of the Curator of Birds, H. Friedmann.

***Tetrastes sewerzowi secunda* Riley. SEVERTZOW'S HAZEL-GROUSE.**

Stevens took six adults and one chick in Szechwan at altitudes ranging from 13,000 to 14,000 feet. These were taken at Chi-li, May 1929; near Kwan-chiai, July 1929; and above Yulong-kong in July 1929. The chick was secured July 30, 1929, at a camp on the mountain-side south of Kwan-chiai.

***Tetraophasis szechenyii* Madarász. SZECHÉNYI'S PHEASANT.**

A single adult female of this species was taken at Ku-lu, Szechwan, April 20, 1929.

***Perdix hodgsoniae sifanica* Przewalski. PRZEWALSKI'S PARTRIDGE.**

A pair of adult birds was taken at 12,500 feet, at a point south of Peh-sang, Szechwan, July 17, 1929.

***Coturnix coturnix japonica* Temminck and Schlegel. JAPANESE QUAIL.**

One male quail is in the collection from Sui-fu, Szechwan, October 18, 1929.

***Ithaginis cruentus clarkei* Rothschild. CLARKE'S BLOOD-PART-RIDGE.**

One adult male from Nguluko, Yunnan, February 24, 1929.

It is a pity that Stevens got but a single specimen, as the one he did secure appears to be somewhat intermediate and tending toward *geoffroyi*. The throat is red, exactly as in *clarkei*, but the centers of the long feathers of the lower neck are grayer and much less buff, more as in *geoffroyi*. The chest, also, is much less mottled with blood red and the red spots themselves are smaller.

***Ithaginis cruentus geoffroyi* Verreaux. GEOFFROY'S BLOOD-PARTRIDGE.**

Eight adults, both sexes. These were taken at the following places in Szechwan, at altitudes ranging from 12,000 to 13,800 feet: Ku-lu,

April; Baurong, May; Hadja-tungoo, June; Yulong-kong, June and July; and Kwan-chiai in August 1929.

**Crossoptilon crossoptilon crossoptilon** (Hodgson). WHITE-EARED PHEASANT.

Eight adults and nine chicks were secured in Szechwan at the following places: Wu-shi, May; Itze, April; Chauloo, May; Yulong-kong, July; and Sin-tien-tze, in August 1929. The nine chicks were all taken at Wu-shi, May 25, 1929.

**Phasianus colchicus elegans** Elliot. ELEGANT PHEASANT.

Stevens took four males, three females and two chicks at the following places: in Yunnan at Nguluko in February and Yung-ning in March 1929; in Szechwan at Ku-lu in April 1929, two adult males. The chicks were secured at Yulong-kong, Szechwan, in June 1929.

Until I compared this series, together with many other skins, with the type and with a long series of topotypes of *P. c. rothschildi* La Touche, I had always thought that Rothschild (Nov. Zool., 33, 1926, p. 207) was right in considering *rothschildi* a synonym of *elegans*. I am now convinced that *rothschildi* of the subtropical hills about Mengtsz, Yunnan, can be distinguished. It differs from *elegans* by the lighter color of the tail and flanks, but especially by the pale straw yellow edges of the feathers of the interscapular region. These become paler and yellower still in worn-plumaged, spring-killed birds. Worn spring-plumaged examples of true *elegans* keep the strong coppery color of the interscapular region, which never in any stage of plumage fades to the pale and yellow color shown in every skin of *rothschildi*. I therefore recognize *Phasianus colchicus rothschildi* La Touche as a valid form.

**Chrysolophus amherstiae** (Leadbeater). LADY AMHERST PHEASANT.

Lady Amherst Pheasant is represented in the collection by seven adults, four males and three females, and one immature male partially molted into adult plumage, all taken in Szechwan at Muli in March and April; at Baurong in May 1929.

**Columba leuconota gradaria** Hartert. SNOW PIGEON.

The Snow Pigeon was found at high elevations all through Szechwan and nine specimens were preserved. These are from Saghi, April; below Tiya, April; Lanepa, May; Che-to, June; and

Yulong-kong, July 1929; taken at altitudes ranging from 9,000 to 12,800 feet.

***Columba rupestris rupestris* Pallas. HILL PIGEON.<sup>1</sup>**

Five adults and one immature of the Rock Pigeon were taken in Szechwan as follows: Chen-tze, May; between Zamba-ku and Hadja-tungoo, May; Peh-sang, July; and north of Hlagong, July 1929.

***Columba hodgsonii* Vigors. SPECKLED WOOD-PIGEON.**

Stevens took three examples of this species at Shih-shah-shi, Szechwan, October 8, 1929.

***Streptopelia orientalis orientalis* (Latham). RUFOUS TURTLE DOVE.**

Six specimens. These were taken in Yunnan at Ao-wah, March, Yung-ning, March, and at a camp above Sugzo, March 1929; in Szechwan at Baurong, May 1929.

***Streptopelia chinensis forresti* Rothschild. YUNNAN SPOTTED DOVE.**

One female was taken at Nguluko, Yunnan, February 15, 1929.

***Oenopopelia tranquebarica humilis* (Temminck). BURMESE RED TURTLE DOVE.**

Four specimens, three males and a female. These were all taken in Szechwan, at Chen-tze, May; Chi-ti, May; Che-to, June; and Peh-sang, July 1929.

***Fulica atra atra* Linné. COOT.**

One female taken at Sui-fu, Szechwan, October 16, 1929.

***Totanus totanus eurhinus* Oberholser. EASTERN REDSHANK.**

Two adult males were taken in Szechwan, one at Hlagong July 22, and the other at Kwan-chiai July 28, 1929.

***Tringa ochropus* Linné. GREEN SANDPIPER.**

One female was taken at Yung-ning, Yunnan, March 21, 1929.

***Rhyacophilus glareola* (Gmelin). WOOD SANDPIPER.**

One adult female; Szechwan, Kwan-chiai, July 28, 1929.

<sup>1</sup>Riley (Proc. Biol. Soc. Wash., 43, p. 133, 1930) has named the Szechwan bird *C. r. austrina*. I have no opinion in the matter, as I have not been over material since.

*Actitis hypoleucos* (Linné). COMMON SANDPIPER.

Two males; Szechwan, Sui-fu, October 18, 1929.

*Capella stenura* (Bonaparte). NARROW-TAILED SNIPE.

One female was taken at Shang-kuan, Yunnan, January 20, 1929.

*Capella gallinago gallinago* (Linné). COMMON SNIPE.

Five adults, both sexes, all from Nguluko, Yunnan, February 14, 1929.

*Capella g. raddi* (Buturlin) is a well-marked form, but probably its range is quite restricted. The breeding birds taken by the late John Koran, on the Arctic coast of Siberia in the neighborhood of Kolymsk, etc., are very pale with almost completely white axillaries and white wing lining, with but few dusky spots only, near the carpal edge. Such birds seem seldom to be taken on migration although I have seen a few. All the snipes in the present series are quite like European examples.

*Capella solitaria* (Hodgson). SOLITARY SNIPE.

Three solitary snipes were secured, one male at Nguluko, Yunnan, February 8, and a male and a female at Ku-lu, Szechwan, April 15, 20, 1929.

*Ardeola bacchus* Bonaparte. CHINESE POND-HERON.

Three females are in the collection from Szechwan, one taken at Baurong in May and two from above Che-to in June 1929.

*Grus nigricollis* Przewalski. BLACK-NECKED CRANE.

Two Black-necked Cranes were taken March 20, 1929, at Yung-ning, Yunnan. One is an adult male, the other a somewhat immature female with the black feathers of the adult plumage of the head and neck coming in in irregular patches through the general dirty brownish of the older plumage.

*Casarca ferruginea* (Pallas). RUDDY SHELDRAKE.

Three specimens, all from Szechwan: a male taken at a point north of Tavzyen, May 30, and two females in faded and abraded plumage taken at Hlagong, July 19, 1929.

*Anas platyrhynchos platyrhynchos* Linné. MALLARD.

A pair of mallards was taken at Nguluko, Yunnan, the male February 8, the female February 14, 1929.

**Anas crecca** Linné. TEAL.

Four teals are in the collection. These are two females from Yunnan, one from Nguluko February 8 and one from a lake on the Gaba plateau March 8; and a male and female from Sui-fu, Szechwan, killed October 16, 1929.

**Gyps himalayensis** Hume. HIMALAYAN GRIFFON.

One vulture of this species, a male, was secured at 13,500 feet at a point north of Hlagong, Szechwan, July 21, 1929.

**Accipiter nisus nisosimilis** Tickell. ASIATIC SPARROW-HAWK.

One immature male, Yunnan, Nguluko, February 26, 1929.

**Accipiter nisus melanoschistus** Hume. INDIAN SPARROW-HAWK.

One adult male, a very dark bird, was taken at Nguluko, Yunnan, February 17, 1929.

**Buteo buteo burmanicus** Hume. JAPANESE DESERT-BUZZARD.

One male was taken at Shang-kuan, Yunnan, January 20, 1929.

Collin and Hartert (Nov. Zool., 34, 1927, p. 51) have pointed out that on account of preoccupation of *Falco buteo japonicus* Temminck and Schlegel, *Buteo burmanicus*, the next earliest name, must come into use. They refer this name to Oates. Mr. Peters, however, tells me that there is no evidence that Oates wrote the article (Stray Feathers, 3, 1875, p. 30) in which the name appears, and that undoubtedly it was written by Hume himself, who just now and then includes notes of Feilden and Oates.

**Gypaëtus barbatus grandis** Storr. LAMMERGEYER.

Two specimens, a fine adult male from above Yulong-kong, Szechwan, at 12,200 feet taken July 1, 1929, and an immature without a label.

**Falco peregrinus peregrinator** Sundevall. SHAHIN FALCON.

One female, referable to this form, was brought alive to Stevens by a Lolo and died two days later. It had a clipped wing and the tail was badly battered. This was at Jhay-shui-tha, Yunnan, March 23, 1929, but it is, of course, wholly possible that the bird was not caught at that place.

**Falco tinnunculus interstinctus** McClelland. KESTREL.

One adult female, Szechwan, Tai-ling, July 25, 1929.

***Strix nivicola* (Blyth). HIMALAYAN WOOD-OWL.**

One adult female taken at Baurong, Szechwan, May 3, 1929.

I have examined and compared the types of both *harterti* La Touche and *nivipetens* Riley and can find no ground for recognizing either of them.

***Psittacula derbyana* (Fraser). DERBY'S PAROQUET.**

Three specimens, a male and two females, were taken in Szechwan. These were secured at altitudes ranging between 10,700 and 11,200 feet, in a coniferous forest above Kopadi April 11, and at Yatsa April 29, 1929.

***Alcedo atthis bengalensis* Gmelin. INDIAN KINGFISHER.**

Two males, Szechwan. Sui-fu, October 17, 1929.

***Upupa epops saturata* Lönnberg. TIBETAN HOOPPOO.**

Nine specimens. These were taken in Yunnan at Nguluko, February, and at Yung-ning, March 1929; in Szechwan at Saghi, April, and north of Tatsienlu, August 1929.

***Caprimulgus indicus jotaka* Temminck and Schlegel. JAPANESE JUNGLE NIGHTJAR.**

One somewhat immature male was taken at Moah-ter, not far from Mouping, Szechwan, September 12, 1929.

***Cuculus sparveroides* Vigors. LARGE HAWK-CUCKOO.**

One adult male was secured at Muli, Szechwan, April 9, 1929.

***Cuculus canorus bakeri* Hartert. KHASIA HILLS CUCKOO.**

Four adults, two males and two females, all from Szechwan, taken at a point near Wu-shi, May 31; at Hadja-tungoo, June 1; at Yu-jakew Pass, July 1; and Ying-kuan-chiai, July 15, 1929.

I am sure that the breeding cuckoo of the mountains of central China is *bakeri*, having the darker back and blacker barring below of that form, and that the paler *telephonus* occurs in this region only as a migrant.

***Picus canus setschuanus* Hesse. CHINESE BLACK-NAPED WOOD-PECKER.**

Stevens took an adult male and an immature male Green Woodpecker together at a point between Zamba-ku and Hadja-tungoo, Szechwan, May 31, and an adult female at Lanepa, May 8, 1929.

Both old birds are very much discolored and worn in plumage.

**Dryobates hyperythrus hyperythrus** (Vigors). RUFOUS-BELLIED WOODPECKER.

An adult male was taken at Wu-shi, Szechwan, May 21, and an adult female at Tongola, Szechwan, July 16, 1929.

Rothschild (Nov. Zool., 33, 1926, p. 239) has shown that the form inhabiting northwestern Yunnan is the same as that of the eastern Himalayas—*hyperythrus*. With this form also belong the breeding birds of western Szechwan. On the other hand, two birds from Mengtsh, Yunnan, one taken March 14, 1911, the other January 15, 1921, are wholly referable to *D. h. subrufinus* Cabanis and Heine, and were of course migrants or winter visitors from northeastern China.

**Dryobates major stresemanni** Rensch. GREATER SPOTTED WOODPECKER.

During the course of his travels through Szechwan, Stevens took thirteen specimens of this woodpecker: at Muli in March; Wu-shi in May; the valley gorge of Lee-chu in May; at a point between Zamba-ku and Hadja-tungoo in May; and at Hadja-tungoo in June 1929.

**Dryobates semicoronatus omissus** Rothschild.<sup>1</sup> YUNNAN PIGMY WOODPECKER.

One adult male was taken at Muli, Szechwan, April 4, 1929.

Muli is only just across the boundary line from Yunnan and this form is the one that might therefore be expected to occur in this part of southwestern Szechwan. Still I believe this is the first record for Szechwan. The wing is slightly worn down at the tip and in its present condition measures 100 mm.

**Picoides tridactylus funebris** Verreaux. CHINESE THREE-TOED WOODPECKER.

Stevens secured no less than seven specimens of this species, hitherto considered a rare bird. They were all taken in heavy coniferous forest at altitudes ranging from 11,300 to 13,500 feet: in Yunnan at a point six days' march from Nguluko March 13; in Szechwan, at Ku-lu, April, at Wu-shi, May, and at a point two days' march from Wu-shi, May 1929.

<sup>1</sup>Cf. Riley (Proc. U. S. Nat. Mus., 80, Art. 7, p. 22, 1931) who uses the name *clementii* La Touche. I have had no opportunity to compare skins since Riley's paper came out.

***Dryocopus forresti* Rothschild. FORREST'S WOODPECKER.**

A fine adult male of this species was taken on the second day's march from Muli, Szechwan, April 11, 1929. The specimen has a wing of 255; bill to base of forehead 64; exposed culmen 58 mm.

This is the first record of this species for Szechwan.

***Picumnus innominatus chinensis* (Hargitt). CHINESE PICULET.**

Three specimens, all from Szechwan. These were taken at Muli in April and above Wan-nieu-si in October 1929.

***Delichon urbica cashmiriensis* Gould. KASHMIR HOUSE-MARTIN.**

One adult male taken at Yulong-kong, Szechwan, July 1, 1929.

***Riparia rupestris* (Scopoli). CRAG-MARTIN.**

Three Crag-martins are in the collection: two from Yunnan, Nguluko, February 22, and Yangtze Valley, March 14, 1929; one from Szechwan, north of Kutsa, August 18, 1929.

***Hirundo daurica daurica* Linné. DAURIAN SWALLOW.**

One adult male from north of Hlagong, Szechwan, July 21, 1929. Wing 122 mm.

***Alseonax muttui* (Layard). LAYARD'S FLYCATCHER.**

One adult male, Baurong, Szechwan, May 5, 1929.

***Siphia parva albicilla* (Pallas). EASTERN RED-BREASTED FLY-CATCHER.**

A male was taken at Baurong, Szechwan, May 2, 1929, and a female at Wu-shi, Szechwan, May 12, 1929.

***Siphia strophciata strophciata* Hodgson. ORANGE-GORGETED FLY-CATCHER.**

Five specimens. These are all from Szechwan and were taken at Muli and Ku-lu in April; near Meipeng in August; and at Sui-fu in October 1929.

***Muscicapula tricolor tricolor* (Hodgson). SLATY-BLUE FLY-CATCHER.**

One adult female taken at Wu-shi, Szechwan, May 23, 1929.

All Chinese birds belong to this race. *M. c. cerviniventris* is a much darker bird.



**Muscicapula hodgsonii** (Verreaux). HODGSON'S FLYCATCHER.

Seven adults, both sexes, were taken in Szechwan, at Chi-li, Baurong and Wu-shi in May, and in a valley east of Kwan-chiai in July 1929.

**Chelidorhynch hypoxanthum** (Blyth). YELLOW-BELLIED FLYCATCHER.

One adult male taken on the third day's march from Muli, April 12, 1929.

**Rhipidura albicollis albicollis** (Vieillot). WHITE-THROATED FANTAIL FLYCATCHER.

Four White-throated Fantail Flycatchers were secured, all at Muli, Szechwan, in April 1929.

**Culicicapa ceylonensis calochrysea** Oberholser. CHINESE GRAY-HEADED FLYCATCHER.

Five adults and one juvenile were taken in Szechwan. The adults were secured at Baurong in May and the juvenile at Mouping, September 7, 1929.

**Pericrocotus brevirostris ethologus** Bangs and Phillips. CHINESE SHORT-BILLED MINIVET.

Four specimens, two males and two females, were taken in Szechwan at Ku-lu in April and at Baurong in May 1929.

These are exactly similar to Hupeh examples and leave no doubt that *P. b. styani* Stuart Baker is the same as *ethologus*.

**Microscelis leucocephalus leucocephalus** (Gmelin). WHITE-HEADED BULBUL.

At Baurong, Szechwan, in May 1929, Stevens took six adults including both sexes. These are all completely white-headed.

**Pycnonotus aurigaster xanthorrhous** Anderson. YUNNAN YELLOW-VENTED BULBUL.

Stevens took five specimens. These were secured in Yunnan at Nguluku in February and March; at Yung-ning in March; and from the Yangtze Valley in March. At Baurong in Szechwan, roughly speaking 125 miles from the Yunnan border, he took one adult female, May 6, 1929, which is in every way similar, with an equally dark chest band, and does not at all approach *P. a. andersoni* (Swinhoe), of the lower Yangtze Valley.

***Pycnonotus sinensis sinensis* (Gmelin). CHINESE BULBUL.**

A pair was taken at Sui-fu, Szechwan, October 16, 1929.

***Spizixus canifrons ingrami* Bangs and Phillips. CHINESE FINCH-BILLED BULBUL.**

Seven specimens. In Yunnan one is from Nguluko, March 5, and two from Ao-wah, March 15, 1929. Four are from Muli, Szechwan, taken March and April 1929.

Rothschild and Stuart Baker following him, claim that the characters used to separate *ingrami* from true *canifrons* Blyth, of the Khasia Hills, are simply those of immaturity. This is not so, for most of the specimens in our very long series of *ingrami* are fully adult. It might be claimed that *ingrami* is too close to *canifrons* to stand as a recognizable subspecies, but to say that its supposed characters are those only of immaturity is absurd.

I continue to recognize *ingrami* by the grayer, less brownish throat and cheeks and the duller green (less yellowish) under parts which appear to me to be sufficient to distinguish it.

***Garrulax lanceolata lanceolata* (Verreaux). CHINESE BABAX.**

Of this species Stevens secured eight specimens, all taken in Szechwan: at Ku-lu in April; at Wu-shi in May; and at Trashi-cho-ten in August 1929.

I am now, having examined much material, wholly in accord with Rothschild and with Stuart Baker in considering *lanceolata*, *yunnanensis* and *bonvaloti* all the same. In the present series the wing length ranges from 96 to 113. I feel sure that some of the specimens have had the sex wrongly determined; if not, the great difference in size between the biggest and the smallest has no bearing on sex.

***Garrulax affinis oustaleti* (Hartert). OUSTALET'S LAUGHING-THRUSH.**

This form was taken by Stevens in Yunnan and in near-by stations in Szechwan. Nine specimens in all were secured, as follows: in Yunnan: second day's march from Nguluko (in the Likiang Range) March 9. In Szechwan: at Muli in March and April; and on the march two days before reaching Muli, March 26, 1929.

***Garrulax affinis blythii* (Verreaux). BLYTH'S LAUGHING-THRUSH.**

One very characteristic example was taken in forest while Stevens was on the march north of Meipeng, Szechwan, 10,100 feet, August 25, 1929.

**Garrulax ellioti ellioti** (Verreaux). ELLIOT'S LAUGHING-THRUSH.

Eighteen specimens are in the collection, as follows: in Yunnan: at Nguluko in February and at Yung-ning in March 1929. In Szechwan: on the march three days before reaching Muli in March; at Muli in April; at Ku-lu in April; at Itze in April; at Wu-shi in May; at Baurong in May; at Tiya in April; south of Kwan-chiai in July; north of Meipeng in August; and at Shih-shah-shi in October 1929.

Rothschild (Avifauna of Yunnan), after listing both *G. e. ellioti* and *G. e. yunnanensis* (Rippon) in about equal numbers from the Likiang Range, says "the latter appears to be a very poor subspecies." I incline to go a little farther still and drop *yunnanensis* altogether as indistinguishable from *ellioti*.

**Garrulax formosa** (Verreaux). EXQUISITE LAUGHING-THRUSH.

Three skins from Shih-shah-shi, Szechwan, in October 1929.

**Garrulax maxima maxima** (Verreaux). GIANT LAUGHING-THRUSH.

Thirteen specimens of this fine large species were secured. In Yunnan it was taken at Nguluko in February and below Fengkou in March. In Szechwan it was taken at Muli in March; south of Sugzo in March; at Ku-lu in April; at Saghi in April; at Zumpa in April; at Wu-shi in May; at Tongola in July; and on the march from Kwan-chiai in August 1929.

**Garrulax ocellata artemisiae** (David). CHINESE WHITE-SPOTTED LAUGHING-THRUSH.

At Shih-shah-shi, Szechwan, 7,425 feet, on October 6, 1929, Stevens took four examples of this uncommon species and lost a fifth.

**Garrulax lunulata** (Verreaux). LUNULATED LAUGHING-THRUSH.

One male in full molt was shot at the fifth camp north of Meipeng, at 10,100 feet, August 21, 1929.

This is either an extremely local species, or really very scarce. Zappey never saw it while he was in western Szechwan, and Weigold on his much more extended collecting trip in the same region also failed to find it.

There are in the Museum of Comparative Zoology two old skins from Tatsienlu that were exchanged from the Paris Museum to La Touche some years ago.

***Garrulax cineracea styani* (Oustalet). STYAN'S BABBLER.**

Three specimens: a male and a female from Muli, Szechwan, April 4 and 5, and a female from the Litang Valley below Muli, April 10, 1929.

All are pale birds with the superciliary line, cheeks and ear coverts olive gray. They come from that part of Szechwan that is close to the Yunnan border.

***Garrulax cineracea cinereiceps* (Styan). GRAY-HEADED BABBLER.**

One female from Omeih sien, Szechwan, October 4, 1929.

This specimen is very richly colored with a deep reddish-olive upper side and chestnut superciliary line, cheeks and ear coverts; below it is much more deeply colored with a vinaceous cast on the breast and almost chestnut flanks.

I have followed Rothschild in his treatment of the subspecies, rather than La Touche, because Rothschild himself was able to examine the all-important specimens in the British Museum.

The two specimens from Szeno, south Yunnan, both killed in February and mentioned by both La Touche and Rothschild, are now lying before me. They both have olive gray superciliaries, cheeks and ear coverts, the ear coverts a little mixed posteriorly with reddish olive. They are a little redder below than the birds listed above from Muli, but distinctly belong with *styani*, according to La Touche, and not with *cinereiceps* where Rothschild listed them in his Avifauna of Yunnan; whereas the one from Loukouchai, Yunnan, listed by Phillips and me, which was killed February 6, is an extreme of *cinereiceps* with deep chestnut superciliaries, cheeks and ear coverts. Thus the finding of both forms in southern Yunnan in winter, suggests that one anyway, and possibly both, are migrants or winter visitors only.

***Garrulax sannio* Swinhoe. WHITE-CHEEKED BABBLER.**

Six specimens of this widespread species are in the collection. All were taken in Szechwan: at Muli in March and April; and at Sui-fu in October 1929.

***Pomatorhinus ruficollis similis* Rothschild. YUNNAN SCIMITAR BABBLER.**

Two males and a female of this form were secured at Muli, Szechwan, March 30 and April 4, 7, 1929.

The Yunnan bird fauna spreads over this part of Szechwan as evinced by the presence of this form and many another.

*P. r. similis* Rothschild is close to *P. r. laurentei* La Touche in color, but the bill of *laurentei* is pink in life, whereas in all other Chinese forms the bill is yellow.

**Pomatorhinus ruficollis eidos** Bangs. STEVENS'S SCIMITAR BABBLER.

*Pomatorhinus ruficollis eidos* Bangs, Occas. Papers Bost. Soc. Nat. Hist., 5, p. 293, June 14, 1930.

Six specimens from Omeih sien, Shih-shah-shi and Sui-fu, Szechwan, October 1929. Type No. 68214 Field Museum from Omeih sien.

This new form secured by Stevens in south central Szechwan is nearest to *P. r. styani* Seebohm of the lower Yangtze Valley from Hupeh downstream, but differs in the much deeper, more chestnut color of the whole upper parts.

**Pomatorhinus macclellandi odicus** Bangs and Phillips. BANGS'S SCIMITAR BABBLER.

Seventeen specimens. In Yunnan it was taken at Nguluko in January and February and at Ao-wah in March 1929; in Szechwan at Muli in April, at Ku-lu in April and at Baurong in May, at which place three nearly fully grown juveniles were secured May 2, 1929.

**Pomatorhinus macclellandi gravivox** David. DAVID'S SCIMITAR BABBLER.

One male and one female, the former from Yulong-kong south of Tatsienlu, Szechwan, June 27, the latter from below Tienta, Szechwan, August 21, 1929.

**Alcippornis nipalensis yunnanensis** Harington. YUNNAN QUAKER-THRUSH.

Two adult females taken at Muli, Szechwan, April 2, 1929.

**Fulvetta cinereiceps cinereiceps** (Verreaux). GRAY-HEADED TIT BABBLER.

One female taken at Shih-shah-shi, Szechwan, October 7, 1929.

**Fulvetta vinipecta bieti** (Oustalet). BIET'S TIT BABBLER.

Eleven specimens of this species were taken by Stevens from the following places: in Yunnan at Nguluko in February, usually at

about 10,000 feet. In Szechwan at Ku-lu in April; at Wu-shi in May; north of Trashi-cho-ten in August 1929.

**Fulvetta ruficapilla sordidior** (Rippon). RIPPON'S TIT BABBLER.

Thirteen specimens taken as follows: in Yunnan at Nguluko in January and February and at Ao-wah in March 1929; in Szechwan at Muli in March and April and at Baurong in May 1929.

**Fulvetta striaticollis** (Verreaux). STRIPE-BREADED TIT BABBLER.

Stevens took nine specimens from Szechwan. These were secured at Chi-li in May, at Ku-lu in April, and on the march from Kwan-chiai in August 1929.

**Moupinia poecilotis poecilotis** (Verreaux). SZECHWAN TIT BABBLER.

One adult male from Shuang-yeu north of Trashi-cho-ten, Szechwan, August 4, 1929.

**Moupinia poecilotis sordidior** Rothschild. YUNNAN TIT BABBLER.

One adult female was taken in Yunnan at Yung-ning March 19, 1929.

**Schoeniparus dubius genestieri** (Oustalet). GENESTIER'S TIT BABBLER.

In Yunnan one female was taken at Nguluko February 16, 1929, and in Szechwan five adults, both sexes, at Muli in March and April 1929.

**Stachyridopsis ruficeps davidi** Oustalet. CHINESE RED-HEADED BABBLER.

One specimen, sex not determined, in full molt, taken at Sui-fu, Szechwan, October 16, 1929.

**Leioptila desgodinsi** (David and Oustalet). DESGODIN'S SIBIA.

There are five adults in the collection which were taken at the following places: in Yunnan at Nguluko in February 1929; in Szechwan at the third camp below the Pass south of Sugzo in March, and at Muli in April 1929.

**Siva strigula yunnanensis** Rothschild. YUNNAN STRIPE-THROATED SIVA.

Five skins are in the collection. Four of these are from Yunnan, taken at Nguluko in February and south of Ao-wah in March; and one from Muli, Szechwan, April 2, 1929.

**Yuhina diademata diademata** (Verreaux). VERREAUX'S YUHINA.

Three specimens were taken at Nguluko, Yunnan, in February, four examples at Muli, Szechwan, in April, and one at Baurong, Szechwan, May 6, 1929, in badly abraded plumage.

Two skins, in excessively faded plumage, were collected near Tienta, Szechwan, August 21, 1929, and on geographical grounds must be true *diademata*.

**Yuhina occipitalis obscurior** Rothschild. DARK-CRESTED YUHINA.

Two females were taken from Yunnan, one on the fourth day's march from Nguluko, at 11,100 feet, March 11; the other at Yi-ship-po, at 9,000 feet, March 14, 1929.

**Leiothrix lutea lutea** (Scopoli). RED-BILLED LIOTHRIX.

One single specimen, in molting condition, of the Japanese Robin was preserved. This was taken, while Stevens was on the march, from a high ridge south of Mouping, September 16, 1929.

**Pteruthius xanthochloris pallidus** (David). PALE SHRIKE BABBLER.

Three adult females taken from Szechwan, two from Muli, April 2, and one from a high ridge south of Mouping, September 16, 1929.

**Nannus troglodytes talifuensis** (Sharpe). TALIFU WREN.

Six adults from Yunnan and one quite the same from Ku-lu, Szechwan. In Yunnan it was taken at Nguluko in February, and one male, in full song, in a ravine at 7,000 feet on the descent to the Yangtze, March 14, 1929. The one from Ku-lu, Szechwan, not far from the Yunnan border, taken April 19, if the two forms are retained as recognizable, belongs here and not with *N. t. szetschuanus* (Hartert).

European ornithologists still use the generic name *Troglodytes* for this group of wrens. It is quite wrong to do so. The American group *Troglodytes* is of tropical origin, of very different habits and song, structurally not the same and should be kept quite distinct from the circumpolar genus *Nannus*.

**Cinclus cinclus beicki** Meise. BEICK'S DIPPER.

Three adults and three immature (in the white-bellied plumage), were taken at Nguluko, Yunnan, in February and at Baurong, Szechwan, in May 1929.

Meise (Orn. Monatsb., 36, September 1928) describes two forms from China, separating them from *C. c. cashmeriensis* Gould. These are *Cinclus cinclus beiki* from north Kansu and *Cinclus cinclus szetschwanensis* from Szechwan. I am absolutely unable to see the slightest difference between these two supposed forms, but by combining them it is seen that the Chinese bird is quite different from *cashmeriensis*, exactly as Meise points out.

My comparison is based on a suite of twenty-four fully adult specimens from the following places: Kansu: Richthofen Range, one; Tao River Valley, two; Choni, two; Minshan Range, one; upper Jupar Valley, two; Hatebbaland, forest of Wantsang Ku, one. Szechwan: Tsaupo, two; Baurong, one; Sungpan, one. Yunnan: Likiang Range, one; Nguluko, two. Kashmir: seven.

***Cinclus pallasii souliei* Oustalet. SOULIÉ'S DIPPER.**

Stevens made but one skin of the Brown Dipper which is from Ko-chiai-ho-pa, Mouping, August 22, 1929. He told me, however, that he saw a good deal of it and noticed that while it often occurred along the same streams as *Cinclus c. beiki*, the two were never found together. The Brown Dipper was seen frequenting the lower and larger parts of the streams, the White-throated Dipper the upper and smaller parts.

***Prunella collaris berezowskii* Serebrowsky. BEREZOWSKI'S ALPINE ACCENTOR.**

One adult female was taken at a point above Yulong-kong, Szechwan, at 15,000 feet, July 2, 1929.

***Prunella fulvescens khamensis* Sushkin. KHAM HEDGE SPARROW.**

Five adults including both sexes. These were taken in Szechwan, at Ku-lu in April and at a point five days' march north of Wu-shi Pass, at 14,700 feet, June 2, 1929. This record extends the known range of the form to the southeast and well into the province of Szechwan.

As Sushkin says (Proc. Bost. Soc. Nat. Hist., 38, No. 1, 1925, pp. 48-55) this is a dark, heavily striped and richly colored form.

***Prunella immaculata* (Hodgson). MAROON-BACKED HEDGE SPARROW.**

Two adult males, one from Ku-lu, Szechwan, April 17, and the other from the camp made south of Kwan-chiai, Szechwan, at 14,000 feet, July 27, 1929.



***Prunella rubeculoides fusca* Mayr. DUSKY ROBIN HEDGE SPARROW.**

Stevens took five adults, both sexes, at Ku-lu and near Wu-shi, Szechwan, in April and June 1929.

As pointed out by Mayr, the Szechwan bird is a good deal darker than *P. rubeculoides rubeculoides* of Nepal and Sikkim.

***Prunella strophciata multistriata* (David). MANY-STRIPED HEDGE SPARROW.**

In this collection there is a series of eighteen skins of this species which represents the following localities: Yunnan: Nguluko, February; Yung-ning, March; Ao-wah, March; and a point seven days' march from Nguluko, March 1929. Szechwan: Ku-lu, April; Muli, March and April; Baurong, May; above Yulong-kong, July; and a point on the march from Kwan-chiai, August 1929.

***Turdus ruficollis ruficollis* Pallas. RED-THROATED THRUSH.**

Stevens made up thirty-three skins of this species, which swarms in China in the winter. These were taken from Yunnan, at Nguluko, in February, at Yung-ning in March and at Ao-wah in March; from Szechwan, at Ku-lu, in April 1929.

***Turdus ruficollis atrogularis* Temminck. BLACK-THROATED THRUSH.**

Stevens took one adult male at Nguluko, Yunnan, February 28, that, like most of the Chinese birds recorded under this name, is intermediate. It has a wholly black throat and chest with no admixture of red but there is some red in the tail. As it is much nearer to *atrogularis* than to *ruficollis*, I list it as such. I believe it has not before been taken in Yunnan.

***Turdus naumanni eunomus* Temminck. DUSKY THRUSH.**

Three specimens, a male and two females, taken in Yunnan at Nguluko, in February 1929.

***Turdus castaneus gouldi* (Verreaux). GOULD'S THRUSH.**

Ten skins including adults of both sexes were taken in Yunnan, on the third day's march from Nguluko, March 10, and in Szechwan at Wu-shi, Chi-li and Baurong in May 1929. One juvenile, in spotted plumage, was taken while Stevens was on the march north from Meipeng, August 27, 1929.

***Turdus kessleri* (Przewalski). KESSLER'S THRUSH.**

Kessler's Thrush was taken in Yunnan at Nguluko in February and March and in Szechwan at Ku-lu in April, at Tiya in April and, a spotted juvenile, at Kwan-chiai July 28, 1929. Eight skins in all.

At Nguluko, Yunnan, the bird was found at 11,000 feet even so early as February 27 and at Ku-lu, Szechwan, at 12,200 feet, at which place Stevens shot two birds on April 14 from a large party scattered over the ground, which was then covered with snow.

Strangely enough the species does not appear to have been taken in Yunnan before. Stevens got three examples, listed here.

***Myiophonus eugenei* Hume. BURMESE WHISTLING THRUSH.**

Seven specimens were taken in Szechwan: from Baurong in May; Ko-chiai-ho-pa in Mouping in August; and above Zuthi in August 1929.

***Monticola solitarius pandoo* (Sykes). INDIAN BLUE ROCK THRUSH.**

A pair of adults taken at Sui-fu, Szechwan, October 18, 1929.

***Enicurus leschenaulti sinensis* Gould. CHINESE FORKTAIL.**

Four adult specimens including both sexes. These were taken from Yunnan, at Nguluko, in February, at watershed below the Yangtze Valley and at Yung-ling plain in March; from Szechwan at Muli in April 1929.

***Chaimarrornis leucocephala* (Vigors). WHITE-CAPPED RED-START.**

One female of this species was secured in Yunnan at Nguluko, February 16, 1929. In Szechwan one specimen was taken from each of the following places: Muli in April; Baurong in May; and Sui-fu in October 1929.

***Phoenicurus hodgsoni* (Moore). HODGSON'S REDSTART.**

Two adult males were taken in Yunnan, one at Nguluko February 14 and the other at Yung-ning March 19. One adult female was secured in Szechwan at Muli April 6, 1929.

***Phoenicurus aureus* (Pallas). DAURIAN REDSTART.**

Two specimens, an adult male from Muli, Szechwan, April 7, and an adult female from Baurong, Szechwan, May 6, 1929, the latter said by Stevens to be one of a mated pair.

**Phoenicurus frontalis** Vigors. BLUE-FRONTED REDSTART.

A male and two females were taken in Szechwan at Muli March 30, above Yulong-kong July 2, and at Yong-Ko Pass, 15,000 feet, April 27, 1929, the latter the female of a mated pair.

**Phoenicurus schisticeps** (Gray). WHITE-THROATED REDSTART.

Eleven specimens, taken from Yunnan at Nguluko in February, at Yung-ning and the watershed between Yangtse and Yung-ling plain in March; in Szechwan at Ku-lu in April 1929.

**Rhyacornis fuliginosa fuliginosa** (Vigors). PLUMBEOUS RED-START.

Two females, one from Yung-ning, Yunnan, March 22, and the other from Baurong, Szechwan, May 5, 1929.

**Hodgsonius phoenicuroides ichangensis** Baker. CHINESE SHORT-WING.

Stevens took two males and a female in Szechwan, at Wu-shi in May and at Shih-shah-shi in October 1929.

The wing in the males is 72 and 73 and in the female 70 mm., which is but little less than in the Indian bird *H. p. phoenicuroides*.

**Calliope tschebaiewi** Przewalski. TIBETAN RUBY-THROAT.

One adult female was taken at 14,500 feet above Yulong-kong, Szechwan, July 2, 1929.

**Ianthia rufilata practica** Bangs and Phillips. RED-FLANKED BUSH-ROBIN.

Two males and two females were taken in Szechwan at Ku-lu in April and on the third day's march from Muli also in April 1929.

**Saxicola torquata przewalskii** (Pleske). TURKESTAN BUSH-CHAT.

Four specimens, two males and a female, taken at Yung-ning, Yunnan, in March and one male from north of the Pass of Hlagong, Szechwan, 12,500 feet, July 24, 1929.

**Rhodophila ferrea haringtoni** (Hartert). EASTERN DARK-GRAY BUSH-CHAT.

Stevens took an adult male at Muli, Szechwan, March 30, and an adult female at Baurong, Szechwan, May 7, 1929.

**Acrocephalus concinens concinens** (Swinhoe). CHINESE PADDY-FIELD WARBLER.

One adult male was taken at Wu-shi, Szechwan, May 14, 1929.

**Cisticola juncidis tintinnabulans** (Swinhoe). FAN-TAIL WARBLER.

One male taken on the right bank of the river north of Kiating-fu, Szechwan, October 10, 1929.

**Phylloscopus subaffinis** Grant. YELLOW-BELLIED BUSH WARBLER.

Stevens took five specimens of this species, securing them in Yunnan at Ming-shih January 18, and at Lidjazah March 24; in Szechwan at Ku-lu April 1929.

**Phylloscopus affinis** (Tickell). TICKELL'S BUSH WARBLER.

Seven adult specimens which were taken in Szechwan at Ku-lu and at Yong-Ko Pass, 15,000 feet, in April; at Wu-shi, Baurong and Baurong Gamba in May 1929.

**Phylloscopus armandi** (Milne-Edwards). ARMAND'S BUSH WARBLER.

Thirteen specimens which were taken from Szechwan, at Wu-shi and Baurong in May, at Yulong-kong and Tatsienlu in June, and north of Trashi-cho-ten in August 1929.

**Phylloscopus maculipennis debilis** (Thayer and Bangs). CHINESE GRAY-FACED WARBLER.

Stevens took one female at Muli, Szechwan, April 2, 1929.

**Phylloscopus pulcher vegetus** (Bangs). CHINESE ORANGE-BARRED WARBLER.

There are three males in the collection, two from Ku-lu, Szechwan, April 14 and 18, and one taken on the march from Kwan-chiai August 3, 1929.

**Phylloscopus proregulus forresti** Rothschild. FORREST'S BUSH WARBLER.

Thirteen specimens were taken from Szechwan: at Ku-lu, second day's march from Ku-lu and third day's march from Muli in April; at Wu-shi, at Chi-ti, and at Baurong in May 1929.

***Phylloscopus proregulus proregulus* (Pallas). PALLAS'S WILLOW WARBLER.**

At Sui-fu, Szechwan, October 17, 1929, Stevens secured three very characteristic examples of Pallas's Willow Warbler, migrants or winter visitors of course.

***Phylloscopus trochiloides* Sundevall. DULL GREEN BUSH WARBLER.**

Eight specimens were taken from Szechwan: at Wu-shi, two days' march from Wu-shi, and at Chi-ti in May; at Kwan-chiai and at Yulong-kong in July 1929.

***Phylloscopus reguloides claudiae* (La Touche). CLAUDIA'S WILLOW WARBLER.**

Fifteen specimens, all from Szechwan, taken at Muli in March and April; below Tiya in April; at Baurong in May; north of Meipeng and at Trashicho-ten in August 1929.

***Abornis albigularis fulvifascies* Swinhoe. FULVOUS-FACED FLY-CATCHER WARBLER.**

Two females were taken at Sui-fu, Szechwan, October 17, 1929.

***Seicercus burkii valentini* (Hartert). BIANCHI'S FLYCATCHER WARBLER.**

Five specimens which were all taken from Szechwan at the following places: Wu-shi in May; on the march in forest north of Meipeng in August; Tu-pa-keo in September; and Sui-fu in October 1929.

***Oligura castaneicoronata* (Burton). CHESTNUT-HEADED WARBLER.**

One male taken at Shih-shah-shi, Szechwan, October 7, 1929.

Rothschild in his *Avifauna* of Yunnan does not subdivide this species and I am sure that he is right. The bird Thayer and I described as *grallator* has been shown by Hartert to be the same as, and of course antedated by, *dejeani* Oustalet, but now, with a fair amount of material, I fail to see how the Chinese bird differs from the Indian true *castaneicoronata*.

Hartert, Stuart Baker and Rothschild all place the genus *Oligura* in the Troglodytidae. I cannot agree to this for the bird seems to me, after careful study, wholly out of place among the wrens. I agree with Riley (Proc. Biol. Soc. Wash., 39, 1926, p. 56) that *Oligura* is a ground warbler (Sylviidae).

**Horeites fortipes davidiana** (Verreaux). DAVID'S BUSH WARBLER.

One female taken at Sui-fu, Szechwan, October 16, 1929.

**Horeites flavolivacea intricatus** Hartert. SHAN ABERRANT WARBLER.

One female taken at Shih-shah-shi, Szechwan, October 7, 1929.

**Suya parvirostris** La Touche. SMALL-BILLED HILL WARBLER.

Stevens took one male in the mountains north of the Yangtze in Yunnan, at 8,000 feet, March 15 and three other examples in neighboring Szechwan, at Muli in April and at Baurong in May 1929.

**Suya crinigera catharia** (Reichenow). SECHWAN HILL WARBLER.

One female, in worn plumage, taken on the high ridge south of Mouping September 16, 1929.

This form although recognized by Stresemann and others, seems to me very close, perhaps too close, to *S. crinigera parumstriata* David and Oustalet.

**Prinia inornata exter** Thayer and Bangs. YUNNAN WREN WARBLER.

One female taken from Shang-kuan, Yunnan, January 20, 1929.

**Lanius sphenocercus giganteus** Przewalski. GIGANTIC GRAY SHRIKE.

One adult male taken at Ku-lu, Szechwan, April 15, 1929.

I was surprised to see from this region a fine adult male of this form in rather well-worn plumage, suggesting that it might be breeding.

**Lanius tigrinus** Drapiez. THICK-BILLED SHRIKE.

One adult male taken at Baurong, Szechwan, May 2, 1929.

**Lanius tephronotus** (Vigors). GRAY-BACKED SHRIKE.

Five adult birds. These were taken in Yunnan at Nguluko and two days' march from that place, February 15 and March 9; in Szechwan at Itze near Ku-lu in April 1929.

Rothschild thinks that this bird should be considered as a subspecies of *L. schach*. I don't like to join together as subspecies two birds so different as are these two, in size, proportions, color, markings and other characters.

***Suthora unicolor canaster* Thayer and Bangs. CHINESE BROWN CROW TIT.**

Two adults, male and female, taken at Wu-shi, Szechwan, May 1929.

***Suthora alphonsiana alphonsiana* Verreaux. ALPHONSE'S CROW TIT.**

Twelve specimens from Kutsa and a point between Zuthi and Waszekow, Szechwan, were taken in August 1929.

***Suthora styani ricketti* (Rothschild). RICKETT'S CROW TIT.**

Twenty-two specimens, all taken from Szechwan: at Muli in March and April; in Litang Valley below Muli in April; at Baurong and Baurong Gamba in May 1929. Stevens reports it as being abundant and found in little parties or troops in this whole general region.

I cannot follow Rothschild in considering this bird a subspecies of the *webbiana* group. There are too many discrepancies, outstanding among which is the color of the closed wing, which is dull brown similar to the back, not bright rufous as is the case in all forms of *webbiana*. In the color of the wing *styani* and *ricketti* are like *brunnea* and if they are to be considered subspecies of anything, it must be of *brunnea*.

Rothschild, however, says that *brunnea* and *ricketti* occur in Yunnan together and the only course, therefore, is to treat this little group of two forms, *styani* and *ricketti*, as another species distinct from both *brunnea* and *webbiana*.

***Parus palustris dejeani* Oustalet. DEJEAN'S MARSH TIT.**

Eight specimens were secured in Yunnan: at Nguluko in February and at Yung-ning in March; in Szechwan at Muli in April; and seven days' march from Ku-lu April 30, 1929.

It would seem too bad to again dig up *Lophophanes poecilopsis* Sharpe, type from Chutung, western Yunnan, after the name had apparently been buried for good by Rothschild in his Avifauna of Yunnan. Still the birds in the present series differ from our few skins of *P. p. dejeani* from middle western Szechwan in being much grayer, the upper parts clearer gray, less brownish gray and the sides and flanks much paler and much less brownish gray. Perhaps these differences will not prove to hold good, but, if they do, then *Parus*

*palustris poecilopsis* (Sharpe) must come into use for the form of Yunnan and extreme southwest Szechwan.

***Parus songarus weigoldicus* Kleinschmidt. WEIGOLD'S WILLOW TIT.**

Five skins were taken in Szechwan: at Ku-lu April 29; Wu-shi and Chi-ti in May; Yulong-kong in June; and north of Hlagong, July 1929.

***Parus davidi* (Berezowski and Bianchi). DAVID'S TIT.**

Stevens took five Père David's titmice in a forest he passed while on the march north of Meipeng, Szechwan, at about 10,000 feet, August 25, 26, 1929.

***Parus dichrous wellsi* Stuart Baker. WELLS'S TIT.**

Two adult males were taken at Nguluko, Yunnan, in February and one female at Ku-lu, Szechwan, April 17, 1929.

***Parus dichrous dichroides* (Przewalski). PRZEWALSKI'S CRESTED TIT.**

Two specimens, a male from Ying-kuan-chiai, Szechwan, July 15, and a female from south of Kwan-chiai, July 27, 1929.

***Parus rufonuchalis beavani* (Jerdon). BEAVAN'S BLACK-THROATED TIT.**

Stevens took eight examples in all. In Yunnan he got it at Nguluko and six days' march from that place in March; in Szechwan at Ku-lu in April, north of Wu-shi in May, south of Kwan-chiai in July, and on the march from Kwan-chiai in August 1929.

***Parus ater aemodius* Hodgson. HIMALAYAN COAL TIT.**

Two females, one taken from Nguluko, Yunnan, February 22 and the other from Wu-shi, Szechwan, May 20, 1929.

***Parus monticolus yunnanensis* La Touche. YUNNAN MOUNTAIN TIT.**

Six examples are in the collection. These were taken from Nguluko, Yunnan, in February and from Muli, Wu-shi, Tu-pa-keo and the high ridge south of Meipeng, Szechwan, from April to September 1929.

I now feel quite sure that if *P. m. yunnanensis* is recognized, then all birds from Yunnan, Szechwan and Hupeh must be referred to it. It is not, however, a strongly marked form.



***Parus major tibetanus* Hartert. TIBETAN TIT.**

Thirteen specimens were secured. In Yunnan it was taken at Nguluko and on the second day's march from Nguluko in February and March; in Szechwan at Muli in March and April, at Tatsienlu in June, and north of Trashi-cho-ten in August 1929.

Peters and I (Bull. Mus. Comp. Zool., 68, 1928, p. 362) have already refused to recognize *Parus m. subtibetanus* Kleinsch. and Weig., type locality Tatsienlu, as being quite indistinguishable from *tibetanus*.

***Parus major artatus* Thayer and Bangs. NORTH CHINA TIT.**

At Sui-fu in the river valley, in extreme south central Szechwan, Stevens took five examples of this form.

***Aegithaliscus concinnus talifuensis* Rippon. RIPPON'S RED-HEADED TIT.**

Two females were taken in the hills, 8,200 feet, on the left bank of the Yangtze, south of Ao-wah, Yunnan, March 15, 1929.

***Aegithaliscus concinnus concinnus* (Gould). RED-HEADED TIT.**

Three specimens, two males and a female, from Sui-fu, Szechwan, all taken October 17, 1929.

***Aegithaliscus bonvaloti* (Oustalet). BONVALOT'S TIT.**

Fourteen specimens. In Yunnan it was taken at Nguluko in February and at Yung-ning and Lidjazah in March 1929. In Szechwan it was gotten on the march two days before reaching Muli in March; at Ku-lu and on the seventh day's march from Ku-lu in April; and north of Trashi-cho-ten in August 1929.

***Aegithalos caudatus vinaceus* (Verreaux). VINACEOUS TIT.**

A pair was taken at Nguluko, Yunnan, at 9,300 feet February 4, 1929, where, Stevens's notes say, it occurred in pairs in the pine forest.

These are very characteristic examples of the large, long-tailed, pale-bellied form with deep vinous flanks and under tail coverts. In the male the wing is 64 and the tail 72; in the female the wing is 67 and the tail 73.

***Regulus regulus yunnanensis* Rippon. YUNNAN GOLDCREST.**

Stevens took eleven specimens at Nguluko, Yunnan, in February, also one at Ku-lu and one on the third day's march after leaving Muli, Szechwan, in April 1929.

***Sitta europaea nebulosa* La Touche. CHINESE MOUNTAIN NUTHATCH.**

Thirteen specimens in all were secured. In Yunnan it was taken at Nguluko and on the fifth day's march from there, in February and March. In Szechwan it was taken at Muli and on the third day's march from Muli in April; at Wu-shi in May; and, one male, at the fifth camp north of Meipeng, 10,000 feet, August 21, 1929. The latter bird had nearly completed the molt and was in the reddish-bellied phase in which the lower parts are almost as deep rusty as in *S. e. sinensis* Verreaux. In this phase *nebulosa* can always be distinguished by other characters and the chin is rusty like the rest of the under parts, not whitish as in *sinensis*.

***Sitta yunnanensis* Grant. YUNNAN NUTHATCH.**

Five adults, both sexes, were taken in Yunnan at Nguluko and on the third day's march from Nguluko in February and March 1929.

***Certhia familiaris khamensis* Bianchi. KHAM TREE CREEPER.**

Four specimens were taken at the following places: one from Nguluko, Yunnan, February 24; one from near Ku-lu, Szechwan, April 24; one from Hadja-tungoo, Szechwan, June 1; and one from Shih-shah-shi, Szechwan, October 7, 1929.

***Certhia himalayensis yunnanensis* Sharpe. YUNNAN TREE CREEPER.**

Four skins are in the collection. These were taken in Yunnan near Nguluko and at Lidjazah in March; in Szechwan, seven days' march from Ku-lu April 30, and at Wu-shi May 24, 1929.

***Tichodroma muraria* (Linné). WALL CREEPER.**

One adult female taken while on the march in a rocky gorge in Mouping September 13, 1929.

***Zosterops simplex simplex* Swinhoe. CHINESE WHITE-EYE.**

A single adult female white-eye was taken at Muli, Szechwan, April 5, 1929.

***Aethopyga dabryi* Verreaux. DABRY'S SUNBIRD.**

Seven males of this beautiful sunbird were secured in Szechwan; at Muli in April, Yatsa in April, and Baurong in May 1929.

In 1925, Riley (Proc. Biol. Soc. Wash., 38, 1925, p. 11) described a specimen from Hupeh as new as *A. d. bangsi*. The supposed differences upon which he based the form are simply degrees of individual variation. In a series of fifty-four males in the Museum of Comparative Zoology, the characters that he used to separate *bangsi* of Hupeh from *dabryi* of Szechwan can be found among skins from any part of the range of the species.

**Motacilla lugubris alboides** Hodgson. HODGSON'S WAGTAIL.

Seven specimens, adults of both sexes and one immature male. Yunnan: Yu-ship-po and Yung-ning, March 1929. Szechwan: Tongola, July, and Sui-fu, October 1929.

I am delighted to follow Stuart Baker in separating the black and white wagtails into several specific groups. This arrangement simplifies matters much.

**Budytes citreola calcarata** (Hodgson). WEIGOLD'S YELLOW-HEADED WAGTAIL.

Three adult males of this long-billed form were taken in Szechwan on the march north of Hlagong and at a point south of Kwan-chiai in July 1929. *B. c. weigoldi* Reinsch is not now regarded as distinct (cf. La Touche, Handbook, 1930, p. 415).

**Anthus hodgsoni** Richmond. EASTERN TREE PIPIT.

Three specimens, all females, were taken in Szechwan: one from Muli, March; one from Yulong-kong, July; and one from Sui-fu, October.

**Anthus roseatus** Hodgson. ROSEATE PIPIT.

Eleven specimens in all were taken. In Yunnan the species was secured at Nguluko in February and at Yung-ning in March 1929. In Szechwan, at Ku-lu in April; at Baurong in May; and at Yulong-kong in July 1929.

**Anthus spinoletta japonicus** Temminck and Schlegel. JAPANESE WATER PIPIT.

One very characteristic example of this dark race was taken at Nguluko, Yunnan, February 14, 1929. I believe this is the first record for this pipit for Yunnan.

**Eremophila alpestris khamensis** (Bianchi). KHAM SHORE LARK.

Eight specimens, adults of both sexes and one juvenile, were taken in Szechwan at altitudes ranging between 13,500 and 14,700 feet, at

Hlagong in July; at a point five days' march north of Hadja-tungoo Pass in June; and south of Tai-ling in July 1929. The one young, about two-thirds grown, was killed at Hlagong, July 22, 1929.

***Alauda arvensis inopinata* Bianchi. BIANCHI'S SKY LARK.**

Four sky larks from central Szechwan, including one juvenile, apparently belong to this form. These were taken at Tai-ling, Kwan-chiai, Ying-kuan-chiai and at a point north of Hlagong, all in July 1929 and at altitudes ranging from 12,875 to 14,000 feet.

They are in much abraded and well-worn midsummer plumage and the wing tip is consequently shortened. The wing in its present condition in the three adult males is as follows: 105, 107, 108.

***Alauda arvensis weigoldi* Hartert. WEIGOLD'S SKY LARK.**

Thirteen specimens, both sexes, were taken in Yunnan at Nguluko in January and February and at Yung-ning in March; in Szechwan just across the border from Yunnan at Ku-lu in April 1929.

These skins are all referable to the larger form *weigoldi*, which is slightly larger than *coelivox*, the bird of south China. In the present series the wing length in the males is: 99, 100, 100, 100, 102, 103, 103, 104, 104. In the females: 98, 99, 101, 102. The race, however, does not seem to be well marked.

***Chloris sinica sinica* (Linné). CHINESE GREENFINCH.**

Two specimens, one male, one sex undetermined, Szechwan, Sui-fu, October 18, 1929.

***Eophona migratoria sowerbyi* Riley. SOWERBY'S BLACK-TAILED HAWFINCH.**

Six examples, three males, three females, Szechwan, Sui-fu, October 18, 1929.

After examining a long series of skins I cannot find any constant character by which *sowerbyi* can be separated from *pulla*, and am wholly of the opinion that they represent one and the same subspecies. However, *sowerbyi* Riley 1915 must stand and *pulla* Pennard 1919, which was given as a substitute name for *melanura*, preoccupied, must lapse into synonymy.

***Perissospiza carnipes carnipes* (Hodgson). WHITE-WINGED GROS-BEAK.**

Four specimens, two males and two females. These were taken in Szechwan after crossing the Yong-Ko, in coniferous forest at 14,500 feet, on April 27, 1929.

***Perissospiza icteroides affinis* (Blyth). ALLIED GROSBEAK.**

Thirteen specimens, adults of both sexes, Szechwan: Ku-lu, Itze camp and valley beyond (running north and south); and about two or three days' march from Ku-lu, April 19–25, 1929.

The males in this series vary much in their body color. Four are yellow but three are of a deep orange on the rump and whole under parts below the black throat, the orange color not much paler than that of the hind neck.

***Fringilla montifringilla* Linné. BRAMBLING.**

Four examples, two males and a female from Yunnan, Nguluko, February 15, 20, 21, 1929, and one female from Szechwan, Baurong, May 6, 1929.

***Procarduelis rubescens saturator* Rothschild. DARK ROSE FINCH.**

One fine adult male was taken in the forest at 9,800 feet while Stevens was on the march from his fifth camp north of Meipeng, August 25, 1929.

***Carduelis ambiguus* Oustalet. YUNNAN GREENFINCH.**

Two males and a female were secured in Yunnan, two at Nguluko, February 24 and one two days' march from that place March 9, 1929.

My own preference is to combine *Carduelis*, *Spinus* and *Astragalinus* but to keep *Acanthis*. Both Rothschild and Hartert feel that *Acanthis* should also be merged with the others to form one large genus.

***Acanthis flavirostris miniakensis* Jacobi. MINIAKI TWITE.**

Two examples, male and female, were taken July 14, 1929, south of Ying-kuan-chiai at 13,000 feet.

Although in much abraded midsummer plumage, making positive identification difficult, I believe these skins are referable to *miniakensis*.

***Leucosticte nemoricola nemoricola* (Hodgson). HODGSON'S MOUNTAIN FINCH.**

Stevens collected twenty-one examples of this species. In Yunnan he took it at Nguluko in March 1929 and in Szechwan at Tai-ling in July 1929 and Ku-lu in April 1929.

***Erythrina erythrina roseata* (Blyth). INDIAN ROSE FINCH.**

Two males, one in full rosy plumage and the other similar in color to the female: Szechwan, Tatsienlu, June 4, and Yulong-kong, south of Tatsienlu, July 29, 1929.

The type locality of *roseata* is Nepal. I have seen no skins from there, but birds from Sikkim, which I suppose must be the same, I am wholly unable to distinguish in any way from birds of the mountains of central China, Hupeh, Szechwan, Kansu, etc. I therefore for the present at least do not recognize *Erythrina erythrina setshuanica* Stantschinsky (J. F. O., April 1929, p. 311).

In spite of Berlioz's plea (Bull. du Mús., 1929, p. 132) that we should return to *Carpodacus* as the generic name of the rosy finches, I still adhere for the present at least to *Erythrina*, believing that the proper name by which these birds must be known is still somewhat in doubt.

***Erythrina rubicilloides rubicilloides* Przewalski. KANSU GREAT ROSE FINCH.**

Seven specimens, three rosy males, three females and one male in plumage like the female. Szechwan: Itze April, Saghi April and Ku-lu April 1929 at altitudes between 11,700 and 13,700 feet.

***Erythrina thura feminina* (Rippon). YUNNAN WHITE-BROWED ROSE FINCH.**

Twenty-four specimens, adult males and females and several young males in plumage similar to the female. In Yunnan, Stevens took the species at Nguluko in February and March and in Szechwan at Ku-lu in April, Itze in April, Chi-ti in May, Wu-shi in May, near Sugzo in March, and Tiya in April 1929.

All skins from Szechwan, a very large series, that I have examined belong to the dark-backed form *feminina*, and are not in any way different from birds from Yunnan. Years ago Thayer and I referred the birds collected by Zappey to *dubia*; this, however, is not correct; they like the others are really *feminina*. All the birds, twenty-four in number, collected by Rock in Kansu belong to the pale-backed and easily separated *dubia*. Just where the region of intergradation between these two races lies, I do not know.

***Erythrina pulcherrima argyrophrys* (Berlioz). SILVERY-BROWED ROSE FINCH.**

Thirty-eight specimens, adults of both sexes and males in plumage similar to that of the female. In Yunnan Stevens took the species

at Yung-ning in March and at Nguluko in February and March. In Szechwan he secured specimens at Ku-lu in April, Itze in April, Wu-shi in May, Baurong in May, Muli in March and April, Kwan-chiai in July and west of Ying-kuan-chiai in July 1929.

Peters and I (Bull. Mus. Comp. Zool., 68, 1928, p. 374) were, I think, the first to show that two very distinct species were in central and western China, confused under one name. We, however, on account of lack of necessary material for comparison were forced to hold one under the name *pulcherrima* and call the other *dauidiana*. Soon afterwards Berlioz (Bull. du Mús., 1929, p. 130) pointed out that we were wrong and named the long-winged bird as above. Still more recently Stresemann (Orn. Mon., 38, 1930, p. 72) reviewed this group of rosy finches and named the bird with the short wing tip, *eos*.

Stevens's experience in western Szechwan, like that of others who have collected there, was to find both this and the next species, *eos*, together in the breeding season. The two are easily distinguished by both color and size.

#### ***Erythrina eos* Stresemann.**

Sixteen specimens, adults of both sexes and immatures, were secured in Szechwan at Wu-shi in May, Lanepa in May, Tiya in April, and Tatsienlu in June 1929.

#### ***Erythrina verreauxi* (David and Oustalet). VERREAUX'S ROSE FINCH.**

Eleven specimens, adults of both sexes, were taken in Szechwan, at Muli in March and April and Litang Valley in April 1929.

Berlioz has shown (Bull. du Mús., 1929, p. 131) that *Erythrina ripponi* of Sharpe is a pure synonym of *E. verreauxi* (David and Oustalet). I wholly agree with his conclusions.

#### ***Erythrina vinacea vinacea* (Verreaux). VINACEOUS ROSE FINCH.**

Stevens secured two females only of this species, both at Omei-hsien, Shih-Shu, Szechwan, October 6, 7, 1929.

#### ***Erythrina trifasciata trifasciata* (Verreaux). THREE-BANDED ROSE FINCH.**

A single adult male was taken "in forest on march" south of Kwan-chiai, Szechwan, August 3, 1929.

#### ***Loxia curvirostra himalayensis* Blyth. HIMALAYAN CROSSBILL.**

Stevens took three adult males and one adult female and six immatures of both sexes in striped plumage. These were taken in

Yunnan six days' march from Nguluko in coniferous forest at 12,500 feet, April 1929; in Szechwan at Hadja-tungoo June, and on the second day's march from Mi-ling, at 10,000 feet, in April 1929.

All the specimens in the present series are slightly larger than those I have before seen from Yunnan and Szechwan. In color, however, they are similar and the somewhat larger size falls within the limits of variation of the form as given by Stuart Baker. The wing length of the adult males is 91, 88, 89; of the female 86.

***Pyrrhula erythaca altera* Rippon. YUNNAN BULLFINCH.**

Nine specimens in all were secured and these were taken at the following stations: Yunnan near Nguluko March 9, one adult male, and on the fourth day's march from that place a male and a female March 11, 1929. In Szechwan at Muli and Ku-lu, just over the Yunnan boundary, three males and a female, April; at Wu-shi, one female, May; and between Meipeng and Tu-pa-keo one female, August 1929.

After a most careful study of the long series of Chinese bullfinches in the Museum of Comparative Zoology in connection with the present set, I am thoroughly convinced that one form only occurs in Yunnan, Szechwan, Hupeh and Kansu.

I have seen one skin only, an adult male, from the Tsin-ling Mountains and so cannot speak authoritatively on *Pyrrhula erythaca taipaishanensis* Rothschild. In his original description Rothschild does not compare his new form with *altera*, which leaves one wholly in doubt as to how he thought it differed from that form, and his characters do not sound very convincing. It may be that *taipaishanensis* is a local form confined to the Tsin-ling Mountains. I can say, however, that, aside from individual variation, which is great among the males, I can find no differences whatever in skins from Yunnan through Szechwan to Hupeh and Kansu.

In his Hand Book of the Birds of Eastern China (part 4, 1927, p. 307), La Touche places *P. e. taipaishanensis* Rothschild as a synonym of *P. e. wilderi* Riley. This is, I think, wrong. There is in the Museum of Comparative Zoology a fine pair of adults of *wilderi* from the type locality, the Eastern Tombs. It (*wilderi*) is quite different from the other races and can be told at once by its small size and tiny bill. It was probably always a very local form, and now, unfortunately, on account of the destruction of the forest, is threatened with extinction.



**Uragus sibiricus lepidus** David and Oustalet. LONG-TAILED ROSE FINCH.

Twenty-one specimens, adults of both sexes and immatures, were secured as follows: Yunnan, Nguluko, February. Szechwan, Muli, April; Baurong, May, and Wu-shi, May 1929.

**Emberiza pusilla** Pallas. LITTLE BUNTING.

Two males, one from Yangtze Valley, Yunnan, March 14; the other from Yung-ning, Yunnan, March 22, 1929.

**Emberiza fucata fucata** Pallas. SIBERIAN GRAY-HEADED BUNTING.

One female was taken at Sui-fu, Szechwan, October 17, 1929.

**Emberiza elegans elegantula** Swinhoe. SWINHOE'S YELLOW-THROATED BUNTING.

Six specimens, both sexes, taken at Yung-ning, Yunnan, in March and at Muli and near Sugzo, Szechwan, in March 1929.

**Emberiza godlewskii yunnanensis** Sharpe. YUNNAN BUNTING.

Stevens took ten specimens including both sexes of the Yunnan Bunting, in Yunnan. These he got at Nguluko and on the march from that place a few days, in January, February and March; at Yung-ning in March 1929.

**Emberiza godlewskii omissa** Rothschild. NEGLECTED BUNTING.

Two specimens from Szechwan, a male from Wu-shi, May 15 and a female from north of Ying-kuan-chiai, July 16, 1929, both in much abraded plumage, I refer to this form. Sushkin brought the range of his *E. g. khamensis* to include parts of western Szechwan, but I must confess that the skins from Szechwan that he labeled "*khamensis*" in the collection of the Museum of Comparative Zoology, I am unable to tell from *omissa*.

**Uroloncha striata squamicollis** Sharpe. CHINESE WHITE-BACKED MUNIA.

One female from Sui-fu, Szechwan, October 17, 1929.

**Passer montanus obscuratus** Jacobi. CHINESE TREE SPARROW.

Twenty-seven specimens were secured as follows. Yunnan: Ao-wah, March; Yung-ning, March; and Nguluko, February 1929. Szechwan: Ku-lu, April; Baurong, May; Muli, April; Chen-tze, May; Sui-fu, October; and north of Ying-kuan-chiai, July 1929.

The Tree Sparrow of south and southwest Yunnan is *P. m. malaccensis*, as has been pointed out by Rothschild, but the bird in the parts of Yunnan visited by Stevens is like that of Szechwan, Hupeh, etc., and belongs to the decidedly unsatisfactory subspecies *obscuratus*, which is barely, if at all, separable from *P. m. montanus* of Europe.

***Passer rutilans rutilans* (Temminck). RUDDY SPARROW.**

At Baurong, Szechwan, 8,100 feet, Stevens took two males in May that are wholly gray below, and three females that are intermediate in color between this and the next form. At a point north of Kutsa, Szechwan, August 17, 1929, he took one female of the *rutilans* type of coloration. Other specimens from Baurong secured at the same altitude and also in May are very yellow below. Therefore here would appear to be one region of intergradation between the two forms.

***Passer rutilans intensior* Rothschild. YUNNAN RUDDY SPARROW.**

Fourteen specimens: Yunnan, Nguluko, February. Szechwan, Baurong, May, and Ku-lu, April 1929.

*P. m. intensior* is very little different from *P. rutilans cinnamomeus* of India, but, if recognized, birds from the mountain ranges of Szechwan must be referred to it.

***Dicrurus leucophaeus hopwoodi* Stuart Baker. HOPWOOD'S DRONGO.**

A single adult male was taken by Stevens at Baurong, Szechwan, May 2, 1929.

This is a very large individual with a wing of 153 mm. and therefore up to the extreme size reached by this, the biggest of the races of *leucophaeus*. I think *hopwoodi* has not before been recorded from Szechwan.

***Corvus corax tibetanus* Hodgson. TIBETAN RAVEN.**

A pair of ravens was secured at a point north of Hlagong, Szechwan, at 13,500 feet, July 21, 1929. The wing of the male is 472 and that of the female 451 mm.

***Corvus coronoides mengtzensis* La Touche. MENGTSZ JUNGLE CROW.**

One adult male from Wu-shi, Szechwan, taken May 18, 1929, exactly matches La Touche's male type, with the dark and intense under parts of that form.

Southwest Szechwan would therefore appear to lie within the range of *mengiscensis*, if that race can be maintained, which seems doubtful.

**Corvus corone orientalis** Eversmann. EASTERN CARRION CROW.

One juvenile of the Carrion Crow was secured at a point north of Kwan-chiai, Szechwan, July 28, 1929.

This bird except for wings and tail was wholly in the dead black juvenile plumage, with none of the glossy feathers of the adult appearing anywhere. On geographical grounds it is referable to *orientalis* as *C. c. yunnanensis*, if recognizable at all, is, so far as we know, confined to tropical southwest Yunnan.

**Corvus torquatus** Lesson. COLLARED CROW.

One adult male from Sui-fu, Szechwan, October 18, 1929.

**Corvus dauuricus dauuricus** Pallas. DAURIAN JACKDAW.

Six specimens, both sexes and all adult. Five are in the pied and one in the black phase. These were taken at Yung-ning, Yunnan, in March and at Wu-shi, Szechwan, in May 1929.

One bird taken at Yung-ning, March 20, has a bill that is crossed exactly similar to the bill of a crossbill. It was, however, healthy and apparently able to provide for itself.

**Nucifraga caryocatactes macella** Thayer and Bangs. YUNNAN NUTCRACKER.

One adult male was taken at Nguluko, Yunnan, February 20, 1929.

Rothschild in his Avifauna of Yunnan still holds to *N. c. yunnanensis* Ingram as the name for the Yunnan Nutcracker. I, however, am unable to find any characters by which to distinguish skins from Hupeh, Szechwan, Kansu and Yunnan.

**Pica pica serica** Gould. CHINESE MAGPIE.

Six specimens were taken as follows: in Yunnan at Yung-ning in March and at Nguluko (date omitted); in Szechwan at Muli in March and at Sui-fu in October 1929.

**Pica pica bottanensis** Delessert. BLACK-RUMPED MAGPIE.

One adult female with a black rump and a wing of 238 mm. was taken at 14,500 feet, five days' march from Wu-shi, Szechwan,

June 2, 1929, and an immature female with a wing of 237 mm. was shot at a point south of Kwan-chiai, August 1, 1929, at 12,500 feet.

The long wing and long, strong tarsus of *bottanensis* always serve to distinguish it from *serica*, but in all of the skins of *bottanensis* I have examined I can find a trace or an indication of a white rump band by disturbing the feathers of the rump.

***Urocissa erythrorhyncha erythrorhyncha* (Boddaert). RED-BILLED MAGPIE.**

Six specimens. These were taken in Yunnan at Nguluko, male and female February 7, and in Szechwan at Muli in March and April 1929.

Stevens told me that, much to his surprise, he saw jays (*Garrulus*) but twice during the whole course of his travels and both times was unable to shoot one.

***Pyrrhocorax pyrrhocorax himalayanus* (Gould). HIMALAYAN RED-BILLED CHOUGH.**

Stevens collected nine choughs. In Yunnan he took specimens at Nguluko in February and at Yung-ning in March 1929; in Szechwan at Wu-shi in May 1929.



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NEW FISHES OBTAINED BY THE CRANE  
PACIFIC EXPEDITION

BY

ALBERT W. HERRE

CURATOR OF ZOOLOGICAL MUSEUM, STANFORD UNIVERSITY

REPORTS ON RESULTS OF  
THE CRANE PACIFIC EXPEDITION

WILLIAM H. OSGOOD

CURATOR, DEPARTMENT OF ZOOLOGY

EDITOR



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# NEW FISHES OBTAINED BY THE CRANE PACIFIC EXPEDITION

BY ALBERT W. HERRE

Through cooperation of Field Museum and Stanford University, the writer was associated with the Crane Pacific Expedition as ichthyologist. After the return of the expedition, the large collections of fishes were studied at Stanford University and a comprehensive report on them was prepared. Since publication of this report will be delayed for some time, it has seemed advisable to describe a number of new genera and species. With the exception of one from Cuba and several from the Galapagos Islands, all the new forms are from the South Pacific. The principal localities are New Guinea, New Hebrides, Tuamotu Islands, Society Islands, Waigiu Island, Fiji Islands, Solomon Islands, and Marquesas Islands. The type specimens, in all cases, were collected by the Crane Pacific Expedition.

## Family DISPARICHTHYIDAE

Exceedingly elongate, cylindrical, and scaleless eels, with tapering tail; the vent very far forward; the anal beginning almost at the throat and more developed than the dorsal, which begins about twice the length of the head behind the gill opening. The jaws are short and blunt, not extended, with the maxillary arranged as in percoid fishes, above the premaxillary and overlapping it. The teeth are in a single series in both jaws, the maxillary toothless and smooth marginally; the vomerine region has a short row of teeth. The narrow, pointed tongue is adherent. The anterior nostril is midway between the eye and the tip of the snout, larger than the posterior nostril, which is a slit at the upper front of the eye. The large eye is over the angle of the mouth. The gill openings are wide and nearly confluent. The pectorals are very small. The branchiostegals are few.

### **Disparichthys** gen. nov.

The characters of the single genus are sufficiently indicated above; branchiostegals 7.

Type, *Disparichthys fluviatilis* sp. nov.



***Disparichthys fluviatilis* sp. nov.**

*Type* from Marienberg, Sepik River, New Guinea. No. 17192 Field Museum of Natural History. Length 140 mm. May 27, 1929.

The depth is more than 70, the head more than 28 times in the length; as the tail is broken the eel is slenderer than the measurements indicate. The snout equals the eye, 3.33 times in the head.

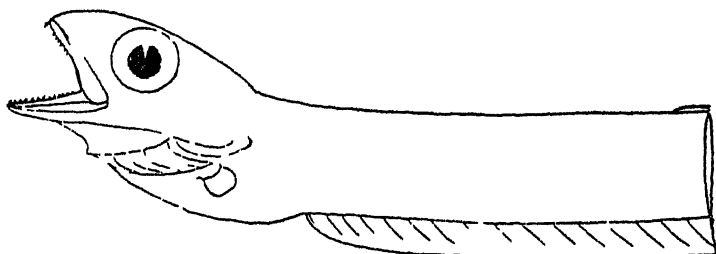


FIG. 31. Head of *Disparichthys fluviatilis* Herre. Five times natural size.

There is a single row of teeth in each jaw, those in the lower jaw small but much larger than the minute teeth of the upper jaw. On the vomer are two median fixed teeth, the hind one much larger than the first one or than any of the jaw teeth. The anal begins at the throat, the distinct rays not counted because of the broken tail.

The color in alcohol is yellowish.

Described from a specimen 140 mm. long; taken from a brook at Marienberg, about a quarter of a mile from the Sepik River, New Guinea.

This singular eel is very different from anything described in the available literature.

### Family MURAENIDAE

***Gymnothorax efatensis* sp. nov.**

*Type* from Vila, Efaté Island, New Hebrides. No. 17193 Field Museum of Natural History. Length 165 mm. March 27, 1929.

The depth is 15, the head 8.68 times in the length; the eye is 7.6, the snout 6.33, the gape 2.37 times in the head. The length of the tail equals that of the head and trunk together. There is a row of eleven sharp pointed teeth on the premaxillary plate, the one at the tip smaller than the others. There are two depressible teeth, the anterior one very small, on the middle line of the premaxillary. There is a double row of teeth on the maxillaries, the

inner row of slender and rather small depressible teeth, the outer row of minute fixed teeth. On the vomer is a double row of blunt rounded teeth, composed of eight pairs, with two single teeth behind these. On each side of the lower jaw is a row of 18 or 20 sharp, fixed, backward-pointing teeth and on each side near the tip an inner row of three much larger depressible teeth. The gill openings are ventral in position.

The ground color in alcohol is yellowish white, everywhere covered with minute irregular spots and markings of purplish brown so that the ground color is reduced to an intricate reticulated maze of fine lines; the dorsal and anal are somewhat paler than the other parts, the coloration and markings otherwise uniform. A female *Gymnothorax*, 165 mm. long, full of eggs 1 mm. in diameter about ready to spawn, was taken at Vila, Efaté Island, New Hebrides. It resembles in color some adults of *Gymnothorax pictus*, but that species retains its juvenile characteristics until it is much larger and is not sexually mature until it is much longer. This pretty little eel was taken from the stomach of a sea-snake; digestion had removed the skin from the snout and anterior part of the top of the head, the specimen otherwise being in fine condition.

### Family ARIIDAE

#### *Arius solidus* sp. nov.

*Type* from Timbunke, Sepik River, New Guinea. No. 17201 Field Museum of Natural History. Length 340 mm. May 14, 1929.

Branchiostegals 6; dorsal I, 7; anal 18; pectoral I, 9.

The body is moderately robust, the broad head nearly as wide as long, its depth 1.4 times in its own width. The depth of the body is 3.85 to 4.75 times, the head 2.96 to 3.25 times, the deeply forked caudal 2.9 to 3.2 times in the total length. The eye is variable, much smaller proportionately in large specimens, 6.33 to 8.3, the snout 2.7 to 3, the interorbital 1.8 to 2, the least depth of the caudal peduncle 4 times (in one large specimen 3.8 times) in the head.

The mouth is very wide, the upper lip thin and the lower lip but little thickened but with a wide thick fold at the angles of the mouth, the upper lip projecting but slightly and the teeth not visible when the mouth is closed. The upper teeth are in a single continuous arched band which is widest posteriorly. The lower teeth are in a narrow discontinuous band, the two halves separated by a median gap anteriorly and widest at the middle near the gap. The entire

palate is covered by a solid plate of finely granulose teeth. The maxillary barbel extends to the base of the pectoral or falls a little short of it. The head shields are granular, arranged in radiating lines, occipital process broad, its width three-quarters of its length, sides converging posteriorly, truncate posterior end reaching the small semicircular granular basal bone before the dorsal spine. The median fontanel is very elongate, more than half the head in length, its forward end extending almost to the lip and its very narrow elongate posterior end reaching nearly to the nape. There is an oval fontanel above the opercle. The triangular humeral process is smooth. There are 8 gill rakers on the upper arm, 14 or 15 on the lower.

The dorsal spine is rough-granulose anteriorly, the hind side with small barbs above, the rest smooth or nearly so, 1.8 to 1.95 times in the head, not including its filamentous prolongation, the dorsal fin 1.4 to 1.6 times in the head. The pectoral spine is granulose to bluntly barbed in front, strongly barbed behind, with a filamentous prolongation, the spine proper 1.5 to 1.7 times in the head. The base of the adipose fin is 1.6 to 1.85 times in that of the dorsal and 4 to 6 times in the distance between the dorsal and the adipose fin. The anal base is 1.9 to 2.2 times in the head. The ventral extends to the anal base, its length 1.9 to 2 times in the head.

In life the color is rich golden bronze, with two rows of golden spots beginning opposite the posterior margin of the dorsal and extending to the caudal. In alcohol the color is rich purplish brown above, the under side white or yellowish white, the lower half of the sides sometimes with a silvery sheen; the fins are all more or less dusky or purplish brown, or the ventrals may be paler, violaceous, and the under side white.

The character of the palatal teeth distinguishes this cat-fish at once; even the smallest specimens obtained showed the palate largely covered by a homogeneous plate, which merely becomes broader and longer in the adult.

The type is a specimen 340 mm. long, taken at Timbunke, a Sepik River village 120 miles from the sea; with it three paratypes, 186 to 253 mm. in length, were obtained.

Other paratypes were collected as follows: ten from Kanganaman, 136 to 226 mm. long; one from Koragu, 287 mm. long; eight from Nyaurangai, 134 to 192 mm. long, all from New Guinea.

**Arius kanganamanensis** sp. nov.

*Type* from Kanganaman, Sepik River, New Guinea. No. 17194 Field Museum of Natural History. Length 178 mm. May 15, 1929.

Dorsal I, 7; pectoral I, 9; anal 17; branchiostegals 5; gill rakers 8+17.

The depth is 4.9, the head 3.25, the deeply forked caudal 3.6, the pectoral 1.35 times in the length. The eye is twice in the snout, 4 times in the interorbital, and 6.1 times in the head. The moderately broad snout is 3 times, the wide interorbital 1.5 times, the least depth of the caudal peduncle 3.4 times in the head.

The breadth of the head is 1.37 times in its own length. The mouth is wide with thin lips and a thickened fold at the angles, the upper lip projecting very slightly, the teeth not visible when the mouth is shut. The upper teeth are small, slender, needle-pointed, in an arcuate band of about 5 or 6 rows, widest posteriorly and divided into right and left halves by a narrow interspace at the apex. The teeth of the lower jaw are in a narrower and more arched band,

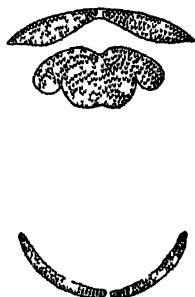


FIG. 2. Teeth of *Arius kanganamanensis* Herre

separated into right and left halves by a median interspace at the symphysis, smaller than the teeth of the upper band. At least some, if not all, of the teeth in both jaws are depressible. The vomerine teeth are in a large patch as shown in the figure, formed by the coalescence of the original right and left patches; at either side is a small patch of palatal teeth, either united with the central patch or exceedingly close to it and forming a lateral wing.

The head shields are granulose, the granules arranged in radiating lines. The occipital process is rather narrow, its sides nearly parallel, its truncate end extending nearly to the small narrow semicircular granular basal bone before the dorsal spine. The median fontanel is very long, pointed at both ends, extending nearly to the nape,

its length 1.4 times in the head. There is an oval fontanel under the upper end of the opercle. The humeral process is smooth, its upper margin concave. The maxillary barbel extends upon the pectoral base and equals the mandibular barbel, each equal to the depth or twice the snout.

The dorsal spine is granulose anteriorly, or with a small spine or two near the tip, the posterior side barbed, 1.6 times in the head. The first dorsal ray is a little longer than the spine. The pectoral spine is like the dorsal spine but is more strongly barbed and a little shorter. The dorsal base is 2.75 times in the head. The base of the adipose fin is 5.5 times in the head, 5.2 times in the distance between the dorsal and adipose fins. The anal base is 1.9 times in the head. The ventral does not reach the anal origin, and is twice in the length of the head.

The color in alcohol is chocolate to blackish above, paler far down on the sides, and yellowish beneath. The ventrals are yellowish with dusky specks distally, the other fins all blackish.

Described from the type, 178 mm. long, in poor condition, purchased at Kanganaman, on the middle Sepik, New Guinea. A paratype, in wretched condition, is the same length. These specimens were in very poor shape when obtained.

**Brustiarius** subgen. nov.

Type, *Arius nox* sp. nov.

This section of the genus *Arius* is distinguished by the greatly increased number of gill rakers, 16 on the upper limb, 28 to 44 on the lower limb, the slender rakers equal to or three-fourths an eye diameter in length.

**Arius nox** sp. nov.

Type from Nyaurangai, Sepik River, New Guinea. No. 17195 Field Museum of Natural History. Length 192 mm. May 22, 1929.

Dorsal 1, 7; anal 17 or 18; pectoral 1, 8 or 9; gill rakers long, slender, 16 above, 28 to 44 below.

The body is slender, elongate, the anterior profile descending in a steep, nearly straight line from the dorsal origin to the tip of the snout, a little concave at and behind the interorbital. The depth is 4.6 to 5.55, the head 3 to 3.3 times in the length. The snout is broadly rounded, the head narrow, its breadth 1.5 to 1.9 times in its length. The deeply forked caudal is 3.25 to 3.66 times in the length.

The mouth is wide with noticeably weak jaws and thin lips, the jaws even and the teeth entirely concealed when the mouth is

shut. The labial fold at the angles of the mouth is little developed. The upper teeth are in a continuous arched band, widest posteriorly and very narrow at the middle. The lower teeth are in a narrow band divided into two sections by a septum at the symphysis, the band broadest anteriorly and tapering posteriorly. The palatal teeth are in four distinct patches forming an arched band, the patches at first small and widely separate; later the inner pair become much larger than the others and close together or nearly contiguous, all the patches becoming rounded or nearly square.

The head shields are finely granulate, the granules in radiating lines, the occipital process slender, its width a little more than half its length, its sides converging, the basal bone before the dorsal very small, curved. The median fontanel is very narrow, elongate, reaching almost to the occipital process, its length three-quarters that of the head. The humeral process is small, triangular, smooth. The barbels are all comparatively short and very slender, the maxillary barbel rarely reaching the pectoral base and usually not extending to the hind margin of the opercle. The mandibular barbel equals the maxillary barbel.

The eye is 6 to 6.9, with a narrow free margin; the snout 3 to 3.2; the interorbital 2.12 to 2.3; the least depth of the caudal peduncle 4 to 4.4 times in the head.

The dorsal and pectoral spines are noticeably slender, their anterior margins granulose, their hind margins with small, blunt serrations, their tips with filamentous prolongations. The dorsal spine is 1.7 to 1.9 times, the pectoral spine 1.75 to 2.15 times in the head. The dorsal height is 1.4 to 1.6, the pectoral length 1.4 to 1.8 times in the head. The base of the adipose fin is contained 5.5 to 7.5 times in the distance from the dorsal to the origin of the adipose fin. The ventrals are short, seldom reaching the anal base, 1.7 to 2.25 times in the head.

The color in alcohol is black above and on the sides, the under surface and a very little of the lower part of the side white, yellowish white, or pinkish white. The fins are all black except the ventrals, which vary from dusky to nearly pale, the under side of the ventrals usually whitish.

Described from the type and five paratypes, 162 to 192 mm. in length, from Nyaurangai, and six paratypes, 159 to 202 mm. in length, from Kanganaman, two villages on the middle Sepik River, New Guinea.

**Hemipimelodus papillifer** sp. nov.

*Type* from Timbunke, Sepik River, New Guinea. No. 17211 Field Museum of Natural History. Length 221 mm. May 14, 1929.

Branchiostegals 5; dorsal 1, 6, 1; anal 19; pectoral 1, 10; gill rakers 9 or 10.

The body is elongate, slender, posteriorly compressed, the head pointed anteriorly, the anterior profile descending in a steep straight line from the dorsal to the snout tip. The depth is 1.6 to 4.7, the head 3.3 to 3.8, the deeply forked caudal 3.7 to 3.95, the pectoral 4.25 to 4.4 times in the length. The eye is 7 to 7.6, the snout 2.75, the interorbital 2.2 to 2.25, the least depth of the caudal peduncle 3.75 to 4.3 times in the head.

The top of the head is mainly smooth, the granules but little developed on the occipital process, which is keeled posteriorly. The median fontanel is much less than half the length of the head and does not extend to the occipital process. The humeral process is roughly triangular, pointed behind, without a crest or ridge. The eye has a narrow free margin, little evident, its posterior margin midway between the tip of the snout and the posterior angle of the opercle, or a little before the middle of that distance. The mouth is small, with a thick, projecting upper lip and a thick fold at the angles, the upper band of teeth nearly entirely exposed when the mouth is closed. The maxillary barbels extend upon the pectoral base or to a third of its length, the other barbels much shorter. The dorsal spine is granulose on its anterior margin, the posterior margin apparently smooth, its tip with a filamentous prolongation. The spine proper 5.3 to 5.5 times in the total length, 1.45 to 1.65 times in the head, the dorsal height 1.3 times in the head. The adipose fin base is 3.3 to 4 times in the distance between the dorsal and the adipose fin and about two-thirds as long as the dorsal base. The pectoral spine is smooth or slightly granulose on its front margin, the posterior side strongly serrate, equal in length to the dorsal spine, the pectoral fin length about 5.5 times in the total length. The anal base is 1.5 to 1.75 times in the head. The ventrals scarcely reach the anal origin or fall short of it some distance, 1.95 to 2.15 times in the head. The pectoral has no axillary pore.

In life the color is bluish dusky above, the lower half silvery on the sides and white beneath, the caudal yellowish, with conspicuous transverse rows of papillae from the dorsal origin to the caudal peduncle, extending downward one-half or three-fourths of the distance to the ventral surface. In alcohol the color is purplish brown

above, the sides more or less silvery bluish, shading into white beneath; the caudal is yellowish, the adipose fin dusky, the dorsal dusky bluish, the anal dusky posteriorly. The lines of papillae are very conspicuous.

Described from the type, a specimen 221 mm. long taken at Timbunke, a village on the Sepik River, about 120 miles from the sea, and two paratypes, 220 and 226 mm. long, taken at Marienberg, Sepik River, New Guinea.

#### Family HEMIRHAMPHIDAE

##### ***Zenarchopterus sepikensis* sp. nov.**

*Type* from Koragu, Sepik River, New Guinea. No. 17213 Field Museum of Natural History. Length 160 mm. May 23, 1929.

Dorsal 13 or 14; anal II, 10; there are 57 or 58 scales in the lateral line, and 7 scales above it to the dorsal origin.

The depth of the elongate, laterally compressed body is 7 to 7.3 times in the length, the breadth 1.5 to 1.6 times in the depth. The head, measured to the tip of the upper jaw, is 3.6 to 3.8 times in the length. The length of the beak is 4 to 4.6 times in the total length, 0.81 to 0.88 of the length of the head without the beak. The eye is 4.6 to 4.9 times in the head, 2 to 2.25 times in the postorbital region, and 0.8 of the flat interorbital. The length of the scaly upper jaw is a trifle more than its basal width. The breadth of the anteriorly rounded preorbital is twice in the eye. The very small, pointed teeth are in bands, the band in the lower jaw exposed, the anterior curved portion narrower than the lateral portions. The pectoral is 1.35 to 1.5 times in the head, one-fourth to one-half longer than the postorbital portion of the head. The fifth, or exceptionally the sixth, dorsal ray is thickened, elongate and often much curved, 1.5 to 2.1 times in the head. In males the origin of the anal is beneath the third dorsal ray, its base 2.5 to 2.9 times in the base of the dorsal, the fourth ray much enlarged, with spatulate, triangular upper half, the fifth and sixth rays also enlarged but not so markedly. In females the anal origin is beneath the fourth dorsal ray, its base 3 times in the dorsal base, with concave posterior margin. The short ventrals are less than one-half the length of the pectorals. The distance from the ventral origin to the caudal base is 1.7 to 1.8 times in the distance from the ventral origin to the eye. The caudal is diagonally truncated, the lower part longest, 5.2 to 5.8 times in the length.



The color in life was bright silvery, the dorsal region greenish, the belly nearly white, the caudal, dorsal, and anal dusky, the beak black. In alcohol the back is brown to blackish brown, the sides paler to yellowish beneath. The sides of the head and trunk are silvery, with a silver band from the angle of the gill opening to the caudal base, widening posteriorly, where it is margined by a black line above. All the fins, except the ventrals, are dusky or blackish.

Here described from the type, a male 160 mm. long, and nine paratypes, four of them females, the latter from 125 to 136 mm. long. The smallest male is 138 mm. in length.

This half-beak was obtained at Koragu, New Guinea, on the Sepik River, about 215 miles from the sea. It is very abundant in the main river and its tributaries and is much used as food by the natives. The native name is *changal*.

Ten specimens, 112 to 132 mm. in length, were secured at Marienberg, on the Sepik River, and three specimens, 63 to 115 mm. in length, at Ambot, on the Kerame River, about thirty miles from the Sepik.

#### Family EXOCOETIDAE

##### **Cypselurus alienus** sp. nov.

*Type* from south coast of Cuba, near Santiago. No. 17224 Field Museum of Natural History. Length 159 mm. November 28, 1928.

Dorsal I, 11; anal I, 7 or 8; pectoral I, 12; scales in lateral series 44; 7 scales above lateral line to dorsal origin; 24 to 25 predorsal scales.

The elongate fusiform body is broad above, the sides moderately compressed, deepest before the ventrals, the depth 5.1 to 5.25 times, the head 3.85 times in the length. The eye is large, not projecting upon the upper profile, equal to the flat interorbital, 2.9 times in the head, the posterior margin of the pupil midway in the length of the head. The snout is blunt, 3.7 times in the head, 1.27 times in the eye. The mouth is moderate, the jaws equal or the lower very slightly projecting. The teeth are very small, conical, in narrow bands on jaws and palatines; none on the vomer. The origin of the dorsal is opposite the twenty-sixth scale, much in advance of the anal, which is beneath the seventh dorsal ray; the base of the anal is 2.3 times in the dorsal base. Pectorals extend beyond base of last dorsal ray. Ventral inserted midway between tip of snout and tip of upper caudal lobe, or midway between last caudal vertebra and

middle or posterior third of opercle, its tip extending to end of anal, much longer than the head, which is about 1.3 times in its length. The caudal is deeply forked.

Color in alcohol brown to purplish brown above, becoming pale silvery on sides, silvery white below; pectorals black within, blackish externally with some silvery luster; paler anteriorly and along lower margin with a reddish brown blotch basally; dorsal and ventrals pale; caudal brownish.

Here described from the type, 159 mm. long, collected on the south coast of Cuba near Santiago de Cuba, and one paratype, 158 mm. long, obtained in Caicos Passage.

Near *C. bahiensis*, but differs in fin ray counts, scalation, position of ventrals, and color of fins.

### Family HOLOCENTRIDAE

#### *Myripristis undecimalis* sp. nov.

*Type* from Takaroa, Tuamotu Islands. No. 17228 Field Museum of Natural History. Length 123 mm. February 12, 1929.

Dorsal XI-1, 14; anal IV, 12; scales 3-28-6; predorsal scales 7; depth 2.2, head 2.9 in length; eye 2.23, snout 4.67 times in head.

The laterally compressed body is thickened in the anterior third, the dorsal and ventral profiles nearly equally convex. The head and snout are boldly convex, the large circular eye prominent and twice the short blunt snout. The interorbital has four strong ridges, two median and one on either side, its breadth 1.66 times in the eye. The mouth is oblique, the lower jaw barely projecting beyond the upper; an external cluster of six short conical teeth at each anterior angle of the symphysis, and one or two similar teeth at each anterior angle of the upper jaw. The maxillary extends to beyond the pupil, beneath the posterior fourth of the eye, its length 1.78 times in the head; a few very small teeth on the lower side of the posterior extremity of the maxillary. The breadth of the expanded distal end of the maxillary is 2.2 times in the eye. The bones of the head are all finely serrate, the opercular spine not much enlarged. The dorsal spines are slender, not very strong, the fourth one longest, 1.68 times in the head. The anterior soft dorsal rays are 2.5 times the posterior ones, only a trifle longer than the fourth dorsal spine. The third and fourth anal spines are of equal length, the third about twice as stout as the fourth, a little shorter than an

eye diameter, 2.6 times in the head. The anterior anal rays equal the longest dorsal rays. The caudal peduncle is slender, its depth a trifle more than three-fourths of its own length. The deeply forked caudal is a little longer than the head. The pectoral is 1.25 times in the head, its tip not extending beyond that of the ventral, which is 1.4 times in the head.

In life the color was bright red, the scales on the dorsal region with darker red edgings and a dark blood-red mark on the shoulder and upper posterior edge of the opercle, the fins paler red. In alcohol the color is red, becoming whitish on the under parts, with a silvery luster over all, each scale on the upper part of the body with a broad blackish vertical bar near the margin. The top of the head is also blackish brown; a dusky bar on the opercle and a black blotch in the pectoral axil. The fins are all pale, yellowish white. The pupil is white.

Here described from the type and only specimen, 123 mm. long, collected by me at Takaroa, an atoll of the Tuamotu Archipelago. This species is close to *M. murdjan* but is separated at once by its dorsal spines.

*Undecimalis*, eleven, because of its eleven dorsal spines.

***Myripristis mooreanus* sp. nov.**

*Type* from Moorea Island, Society Islands. No. 17225 Field Museum of Natural History. Length 86 mm. February 23, 1929.

Dorsal X-I, 14; anal IV, 13 or 14; 38 scales in the lateral line, exclusive of those on the caudal, 4 above and 6 below the lateral line; 8 predorsal scales.

The oblong body is laterally compressed, rather thick anteriorly, the dorsal and ventral profiles moderately convex, the depth 2.4 to 2.5 times, the head 2.94 to 3 times in the length. The head is short and thick, its upper profile descending steeply from the origin of the dorsal. The eye is very large, prominent, high up, 2 times in the head. The broad blunt snout is boldly convex, very short, 5 to 5.3 times in the head and twice in the eye. The interorbital is broad, with two longitudinal ridges, nearly flat, its width 3.6 times in the head, 1.6 to 1.75 times in the eye. The mouth is very oblique, the lips equal; the maxillary extends beneath or nearly as far as beneath the posterior margin of the eye, and is contained 1.75 times in the head; the lower edge of the maxillary is smooth, or may have a few tiny serrations near its posterior angle. The margins of the orbital, suborbital, preopercle, interopercle, and opercle are

all finely to minutely serrate, the opercle with a moderately strong spine at its upper angle. The dorsal spines are weak, slender, the third spine longest, about twice in the head; dorsal rays barely higher than longest dorsal spine. The third anal spine is much stouter than the fourth but approximately equal to it in length, about 1.5 to 1.67 in eye, the anal rays higher than those of the dorsal and longer than the third dorsal spine. The caudal is deeply forked, equal to or a little shorter than the head. The pectoral is slender, nearly equal to the head without the snout.

Color in life dark red with a blackish red bar at the angle of the opercle; fins all bright pinkish red with a narrow violet margin to the dorsal, anal, and caudal. In alcohol the color is pale reddish yellow with a yellow longitudinal band from the opercle to the caudal peduncle, a broad black bar on the upper edge of the opercle, and a black blotch in the axil of the pectoral; a narrow blackish or dusky violet margin on the vertical fins and caudal; each scale on the upper part of the body margined by a vertical dusky violet bar; one or two longitudinal yellow stripes more or less evident on the belly.

Here described from the type, 86 mm. long, and five paratypes, 61 to 88 mm. in length, collected on the island of Moorea, one of the Society group.

#### Family SYNGNATHIDAE

##### **Bombonia uxorius** sp. nov.

*Type* from Waigiu Island. No. 17493 Field Museum of Natural History. Length 93 mm. June 6, 1929.

Dorsal 25; anal wanting; pectoral 15; caudal 6; rings 14 + 40. The dorsal is on the first six rings of the tail.

The slender, angulate, elongate body has a heptagonal trunk and a four-sided tail. All the plates are marked by numerous fine transverse ridges or striae and are also handsomely sculptured. On the belly is a conspicuous sharp keel. The operculum has a prominent median longitudinal keel, with many fine ridges radiating from it. There is a small median crest on top of the snout, a crest above the upper margin of each eye, and a short median longitudinal crest on the nape.

The short trunk is 4 to 4.4 times, the elongate tail about 1.5 times (1.48 and 1.52) in the total length. The head is 9.2 to 9.3 times in the length. The elongate snout equals the postorbital

portion of the head, 2.45 to 2.5 times in the head. The eye is 5 to 5.3 times, the caudal 2.8 to 2.85 times in the head.

The color in alcohol is dark brown, the abdominal keel and caudal fin black.

Here described from two specimens, 83 and 93 mm. in length. Both are males, each carrying many embryos nearly ready to emerge. The folds of skin forming the sides of the egg chamber are large and well developed. The specimens were taken in the mouth of a small fresh-water stream flowing into Majalibit Inlet, Waigiu Island.

This species conforms in every particular to my diagnosis of *Bombonia*, and is close to *Bombonia luzonica* Herre, described in the Philippine Journal of Science, 34, pp. 274-275, pl. 2, 1927.

### ***Micrognathus suvensis* sp. nov.**

*Type* from Suva Harbor, Viti Levu Island, Fiji. No. 17229 Field Museum of Natural History. Length 89 mm. March 13, 1929.

Dorsal 28; anal 3; pectoral 18; trunk rings 15; caudal rings 39-40. The 6 subdorsal rings are all caudal.

The greatest depth of the elongate attenuate body is 43.68 to 44.5 times in the length. The trunk is more or less heptagonal, the entire tail four-sided, the body everywhere with smooth edges. The shields are all transversely though very minutely striate. The head is 8.8 to 9.5 times in the length. The small eye is 6.5 to 7.75 times in the head. The stout straight snout is equal to or longer than the rest of the head, 2 or 1.9 times in the head, with a sharp median crest. The operculum has a well-developed straight median keel which extends entirely across, and has many radiating lines both above and below it. The tail is 2.36 to 2.57 times the trunk, or 1.7 to 1.76 times the head and trunk together. The caudal is 2.3 times in the head. There are no cutaneous appendages. The dorsal begins on the second caudal ring. The superior cristae of the trunk and tail and also their inferior cristae are discontinuous; the lateral median ridge of the trunk is continuous with the inferior crista of the tail.

The color in alcohol is whitish, everywhere darkened more or less by punctulations of excessively minute brown dots; snout dusky; the caudal fin blackish.

Here described from the type, 89 mm. long, and one paratype, 83 mm. long, both obtained in Suva Harbor.

This slender creature differs from the two species of *Micrognathus* given by Weber and Beaufort in the greater length of its snout,

the increased number of caudal rings and dorsal rays, the more posterior position of the dorsal, and the complete opercular keel.

*Suvenensis*, from Suva, the capital of the Fiji Islands.

#### Family MELANOTAENIIDAE

##### *Melanotaenia kabia* sp. nov.

*Type* from Nyaurangai, Sepik River, New Guinea. No. 17230 Field Museum of Natural History. Length 84 mm. May 22, 1929.

First dorsal I, 3 or I, 4, second dorsal I, 9 to 11; anal I, 17 to 20; 35 to 37 scales in a longitudinal series, plus 2 or 3 more on the caudal base, 15 in a transverse series, and 22 or 23 predorsal scales.

The body is strongly compressed, the ventral profile more convex than the dorsal outline, the upper profile concave from the nape to the tip of the snout. The depth is 2.45 to 2.7, the head 3.5 to 3.9, the caudal 3.4 to 3.85 times in the length. The eye and snout are equal or the eye is a very little shorter, 3.25 to 3.7 times, the inter-orbital 2.8 to 3, the least depth of the caudal peduncle 2.4 to 2.6 times in the head. The pointed pectoral equals the head without the snout, 1.3 to 1.4 times in the head, 4.7 to 5.1 times in the length.

The mouth has a slight downward curve in a front view, the jaws rarely equal but the lower usually projecting a hair's breadth, the posterior end of the maxillary never extending to a vertical from the eye but reaching anywhere from halfway between the nostrils to just behind the posterior nostril. The premaxillary overhangs the lower jaw laterally so that some of the teeth are visible. There is an outer row of stout conical teeth in the upper jaw with a few small teeth behind it at the front. The lower jaw has a band of small slender teeth at the front, passing into a single row posteriorly. There is a small patch of minute teeth on the vomer and a row of like teeth on the palatines. The tongue is smooth. There is a single row of scales below the eye or two rows under the rear half of the eye. The opercle is covered with medium-sized scales with a patch of smaller ones above. The first and second dorsal spines are stout, short, about equal in length, 1.5 to 1.6 times in the postorbital part of the head. The anal spine is very short, more than twice in the postorbital part of the head. The length of the anal base is more than the distance from the first dorsal origin to the axil of the second dorsal. The origin of the anal is opposite to or very slightly in advance of the dorsal origin. The dorsal and anal rays are low, the last ray of the second dorsal about twice in the head, the first

dorsal and anal a little higher, 1.33 to 1.5 times in the head. The pointed, elongate ventral extends past the anal spine to the base of the first or second anal ray. The caudal is forked, with pointed lobes, the lower one longer. The scales are crenulate posteriorly. The caudal base is covered with small scales which form a dense sheath over the basal fourth of the fin.

In life the color is dusky silvery above, the lower half with alternate vertical stripes of golden orange or deep orange and silver or steely blue, with an orange band at the caudal base. The top of the snout and interorbital are black, the opercles and preopercles silvery with yellow or golden. The fins are more or less dusky in some, in others the membranes of the dorsal and anal are orange, wholly or only basally, the rays and outer part blackish. In alcohol the color is dusky above, with numerous (8 to 12) vertical blackish stripes, the lower half more or less yellowish, with a silvery sheen over all. A blackish or steel blue line extends from the upper angle of the gill opening to the middle of the caudal base. The cheeks are silvery white. The ventrals are yellow, the other fins more or less dusky; all may be dusky. The lower half of the dorsal is usually black.

Specimens from Koragu have nearly all lost the vertical blackish stripes, the color bluish gray to brownish above, the scales with dusky margins, the lower half paler to yellowish, the top of the snout and interorbital black, the opercle blackish, the preopercle gray. The longitudinal stripe is evident on the posterior half. All the fins are more or less dusky, the caudal often palest.

Described from the type, 84 mm. long, six paratypes, 67 to 73 mm. long, from Nyaurangai, and twenty-six paratypes, 53 to 83 mm. long, from Koragu.

*Kabia*, from *kabi*, the native name at Koragu.

### **Melanotaenia rosacea** sp. nov.

*Type* from Koragu, Sepik River, New Guinea. No. 17245 Field Museum of Natural History. Length 84 mm. May 23, 1929.

Dorsal I, 4-I, 8 or 9; anal I, 17 to 19; pectoral 12 or 13; there are 36 to 38 scales in a longitudinal series, 15 in a transverse series, and 25 (less often 24, rarely 23) predorsal scales.

The form is deep, strongly compressed, the dorsal and ventral profiles both convex but the ventral profile more curved. The anterior dorsal profile is concave on top of the head. The depth is 3 to 3.2, the head 3.33 to 3.7, the caudal 3.5 to 3.75 times in the length. The eye is large, circular, 3.1 to 3.66, the interorbital 2.9

to 3.1 times in the head. The snout equals the eye. The least depth of the caudal peduncle is 2.6 to 2.9 times in the head and 1.33 to 1.6 times in its own length. The pointed pectoral is shorter than the head without the snout, 1.4 to 1.55 times in the head, 5 to 5.6 times in the total length.

The mouth curves downward slightly when viewed from in front, the jaws equal or the lower jaw projecting very slightly, the mouth not extending to a vertical from the posterior nostril, the lateral limb of the premaxillary overhanging the lower jaw so that the teeth on it are visible. There is an outer row of strong, conical, pointed teeth above and below, with a band of very much smaller needle-like teeth behind at the front of each jaw. There is a patch of very small teeth on the vomer, and a row of small teeth on the palatines. The tongue is smooth. There are two rows of scales below the eye, or at least two rows under the rear half of the eye. The opercle is covered with medium-sized scales, those of the anterior and upper rows smaller than the rest. The first and second dorsal spines are stout, curved, equal, or the second dorsal spine longer, longer than the postorbital part of the head, their length reaching from the hind margin of the eye upon the pectoral base. The anal spine is much shorter than the postorbital part of the head, equal to or but little longer than the eye. The length of the anal base is usually more than the distance between the first dorsal origin and the axil of the second dorsal, rarely equal to it. The anal origin is usually opposite that of the dorsal, rarely one scale before the dorsal origin. The dorsal and anal rays are low, about twice in the head. The caudal is forked, with pointed lobes. The scales are conspicuously crenulate posteriorly.

In life a roseate golden luster is conspicuous on the opercles. In alcohol the color is dusky gray above, each scale with a darker margin, becoming pale bluish gray on the middle of the sides, bluish gray or pinkish on the belly. The opercle is dusky or brownish. The fins are all more or less dusky or blackish, or the ventrals may be nearly colorless. The caudal may be merely gray, but the inner margins of the lobes are always black.

The type, 84 mm. long, and thirty-two paratypes, 33 to 76 mm. in length, were collected at Koragu, on the Sepik River, New Guinea.

Nine paratypes, 65 to 72 mm. in length, were obtained at Nyaurangai. These last specimens are brownish or yellowish in alcohol, darker above and paler below, with a silvery luster over all. On the posterior half of the body is a more or less evident median



longitudinal dark steel-colored line or band. All the fins are darkened by minute black specks, the pectorals and ventrals sometimes being nearly colorless.

This species is close to *M. multisquamata* Weber and Beaufort, but differs in several particulars.

***Rhombosoma sepikensis* sp. nov.**

*Type* from Marienberg, Sepik River, New Guinea. No. 17265 Field Museum of Natural History. Length 107 mm. May 10, 1929.

First dorsal I, 3 or 4; second dorsal I, 14 or 15; anal I, 21 to 23; pectoral I, 11 to 13; there are 35 to 37 scales in longitudinal, 10 to 12 in transverse series, and 16 predorsal scales.

The body is much compressed, the ventral profile strongly convex, the back little elevated in young specimens, the dorsal profile descending in a long gently sloping straight line from the dorsal origin to the interorbital, concave from there to the tip of the snout. In large specimens the back is more elevated, in a regular, moderately high arc from the hind margin of the opercle to the caudal peduncle, the interorbital and snout concave.

The depth is 2.6 to 3, the head 3.66 to 3.8, the caudal 4.4 to 4.5 times in the length. The eye is 3.66 to 3.8, the snout 2.9 to 3.1, the least depth of the caudal peduncle 2 to 2.13 times in the head. The eye is a little shorter than the snout, which is twice in the post-orbital part of the head. The jaws are equal or the upper jaw may project, the lower jaw then inferior. The angle of the maxillary may reach a vertical from the front margin of the eye, but usually falls some distance short of it. There are several rows of pointed teeth on the jaws, largest in the upper jaw, extending to the outside of the thickened lips and posteriorly above to the angle of the jaws. There is a patch of small teeth on the vomer, a patch of minute teeth on the base of the tongue, and a row of small teeth on the palatines. There are two rows of scales under the eye. The opercle is covered with medium-sized scales, with two rows of smaller scales on the upper end.

The first dorsal spine is stout, 1.5 times in the head without the snout, a trifle longer than the second dorsal spine. The anal spine equals or is a little less than the second dorsal spine. The length of the anal base equals or is a little less than the distance from the first dorsal origin to the axil of the second dorsal. The origin of the anal is opposite that of the dorsal. The pointed pectoral equals the head without the snout. The depth of the caudal peduncle

slightly exceeds its own length. The caudal is emarginate with rounded lobes. The scales appear entire along their rear margin, but if examined under a good lens after drying they are seen to be crenulated. The basal fourth of the caudal is covered with a sheath of small scales.

In life this little fish has a brilliant metallic luster, bronze, silver, and reddish according to the way the light strikes it, with a conspicuous red flame-colored spot on the opercle. In alcohol the color is dusky or dark brown above, each scale with a pale dusky gray center and blackish margins, the lower part whitish or sometimes pinkish, with a silvery luster. From the tip of the snout a black stripe crosses the eye and runs back to the middle of the caudal base, becoming a wide band on the posterior half where it is one and a half or two scales wide; below this a white band extends from the angle of the pectoral to the caudal base, very conspicuous on the posterior half of the body; bordering the white band below, and above the anal, is a more or less evident black stripe. The fins are all dusky, or the ventrals may be colorless.

Described from the type, 107 mm. long, and thirteen paratypes, 34 to 92 mm. long, collected from a brook tributary to the Sepik River at Marienberg, New Guinea.

This belongs near *R. goldei*, but seems to be different.

### Family ATHERINIDAE

#### *Atherina ovalaua* sp. nov.

*Type* from Ovalau Island, Fiji Islands. No. 17272 Field Museum of Natural History. Length 48 mm. March 20, 1929.

Dorsal VII II, 8; anal II, 8 or 9; pectoral I, 14; scales in lateral series 40 to 42, in transverse series 7; predorsal scales 14 to 16; 7 or 8 scales between dorsals; 22 to 25 gill rakers on lower arch.

The depth of the subcylindrical body is from about 5.9 to 6.2 times in the length. The greatest breadth is 1.17 to 1.26 times in the depth. The head is 3.64 to 3.84 times in the length, bluntly pointed, flattened above, the snout convex. The large prominent eye is 2.75 to 3 times in the head, distinctly shorter than the post-orbital part of the head. The snout is shorter than the eye and equals the interorbital space. The maxillary is less than the eye and extends beneath the anterior margin of the eye. The teeth are minute. The origin of the first dorsal is opposite the sixteenth scale, midway between the caudal base and the front of the eye or, exceptionally,

farther forward. The origin of the second dorsal is opposite the twenty-fifth or twenty-sixth scale. The length of the caudal peduncle is about 1.6 times in the head, its depth 2.37 times in its own length. The caudal is shorter than the head. The pectoral is 1.5 to 1.6 times in the head. The anus is between the ventral tips, about two scales before a vertical from the first dorsal origin. The ventral is 2.1 to 2.3 times in the head. The origin of the second dorsal is about a third behind the anal origin.

The color in alcohol is brownish white, the scales of the back outlined with dark brown crescents and lines; a broad dark silvery or leaden band from the insertion of the opercle to the caudal; usually a row of dots below it; a blue black spot on the occiput with a blackish line extending along the middle of the back to the origin of the caudal; a large blackish brown spot on the opercle; the interorbital space and the upper margin of the eye blackish blue; the top of the snout and the tip of the lower jaw more or less dusky.

Here described from the type and twenty paratypes, 40 to 52 mm. in length, collected by me by the aid of electric light at Ovalau Island, Fiji Archipelago.

I also place here forty specimens from 28 to 66 mm. in length, from Suva Harbor, Viti Levu Island, Fiji. These specimens are all much paler, having faded to pale whitish yellow, with a very bright silver band down the side, and the dorsal scale markings have largely disappeared; the opercle, preopercle, and suborbital are also bright silver; a blue black spot is on the upper margin of the eye; the tip of the snout is dusky, with dark specks.

#### Family APOGONIDAE

##### *Apogon abo* sp. nov.

*Type* from Koragu, Sepik River, New Guinea. No. 17307 Field Museum of Natural History. Length 125 mm. May 23, 1929.

Dorsal VI-I, 9 or 10; anal II, 9; pectoral II, 13; there are 32 or 33 scales in the lateral line to the caudal base plus 7 or 8 more on the latter; 5 above and 12 below the line; predorsal scales 12.

The depth is 2.75, the head 2.35, the caudal 4, the pectoral 5 times in the length. The eye is 5.4, the snout 4, the interorbital 5.3, the premaxillary 1.95, the least depth of the caudal peduncle 2.65 times in the head.

The thick, heavy body is compressed, the head large, the anterior dorsal profile with a decided hump behind the head, the top of the head concave, the eyes projecting above the profile. The mouth is large, strongly oblique, the chin scarcely projecting, the maxillary extending beneath the hind margin of the eye or beyond. The teeth are in six or seven rows in the jaws, forming a fine band both above and below. There are three rows of small teeth on the vomer and a single row on the palatines. A very few minute teeth may be observed on the posterior and lower edges of the preopercle by removing the epidermal or cutaneous flap, the bones of the head otherwise smooth. The stout second dorsal spine is twice the eye. The other spines are all weak. The spine of the second dorsal is also weak, equal to the anal spine, longer than the eye, about 4 times in the head. The caudal is rounded, not emarginate.

The color in alcohol is brownish above, paler to whitish below, with more or less silvery luster on the sides; there are 12 or 13 narrow black stripes running diagonally downward and forward along the side, the first stripe below the origin of the first dorsal, the last two nearly vertical and situated on the caudal peduncle. A blackish stripe runs from the eye to the upper margin of the opercle and a wide black band extends from the lower margin of the eye to the lower edge of the preopercle just behind the end of the maxillary. All the fins are more or less dusky, or the pectorals, anal, and ventrals may be colorless. In life the type was dark olive green above the lateral line, bright brassy yellow on the sides, the belly yellow, with gleams of violet and lavender on the opercles and preopercles; the black stripes were as given already, and very conspicuous; the pectoral was hyaline, the other fins all yellowish and faintly dusky.

Described from the type, 125 mm. long, taken at Koragu, a village on the Sepik, and a paratype, 86 mm. long, seined from a brook at Marienberg. I also have four specimens, 22 to 30 mm. long, from Marienberg, and one, 43 mm. long, from Ambot, on the Kerame River, New Guinea.

The name of this fish is *abó* at Koragu.

***Mionorus pacificus* sp. nov.**

*Type* from Tagus Cove, Albemarle Island, Galapagos Islands. No. 17311 Field Museum of Natural History. Length 29 mm. January 8, 1929.

Dorsal VI-I, 9; anal II, 8; pectoral 11; scales 2-24; gill rakers 7 or 8.

Depth a trifle more than 3 times in the length, the head about 2.7 to 2.9 times. The eye is about 2.7 times in the head, 1.5 to 1.66 times the snout, which is 4 or a little more than 4 times in the head.

Head and body compressed, the head bluntly pointed, with prominent lower jaw. The eyes are large, a little more than inter-orbital. The mouth is oblique, the maxillary extending beyond the pupil but not to the posterior margin of the eye. The jaw teeth are in narrow bands. The caudal is truncate, narrow, 3.5 to 3.6 times in the length. The pectoral is about twice in the head. The ventrals are twice in the head, not reaching the anal fin. The position of the anus varies from beneath the posterior third of the ventrals to just before the anal fin.

Color in life red with silvery metallic luster, the scales on the upper third of the body margined with minute dark specks; a dusky band from the tip of the snout through the eye to above the pectoral; a short vertical blackish bar below the anterior third of the soft dorsal, extending below the lateral line; fins unmarked. In alcohol the red has changed to pale yellowish. The scales are very deciduous so that the markings have disappeared on all but one specimen.

Here described from the type, 29 mm. long, and three paratypes, from 25 to 29.5 mm. in length, collected at Tagus Cove, Albemarle Island, Galapagos Archipelago. The specimens were taken in a trap at a depth of 10 meters or more.

### Family KUHLIIDAE

#### ***Kuhlia bilunulata* sp. nov.**

*Type* from river flowing into Suva Harbor, Viti Levu Island, Fiji Islands. No. 17313 Field Museum of Natural History. Length 84 mm. March 13, 1929.

Dorsal X, 11; anal III, 10 or 11; lateral line 48, with 5 or 6 more tubules on the caudal base; 5 scales between the origin of the dorsal and the lateral line, 10 from the anal origin to the lateral line; 10 or 12 predorsal scales; 22 gill rakers on the lower limb of the first arch.

The depth of the laterally compressed body is 2.6 times in the length, greatest at the origin of the dorsal, the anterior upper profile descending in a steep straight line to the tip of the snout. The lower jaw is projecting, the ventral profile in a broad regular curve. The

head is longer than deep, 2.9 times in the length, much thicker than the body, its breadth about 1.75 times in its own length. The eye is high up, 2.33 to 2.6 times in the head. The broad, flat interorbital is about 0.8 of the eye, 3 to 3.25 times in the head. The broad, short snout is 3.2 to 3.4 times in the head. The mouth is markedly oblique, the posterior end of the maxillary beneath the front margin or anterior third of the eye. The preopercle is smooth behind, its lower margin very minutely serrulate. The opercle is entire, with two flat and rather stout spines, the lower one the stronger. The fifth dorsal spine is longest, 1.6 times in the head. The tenth spine is much longer than the ninth, 2.4 to 2.6 times in the head, the third anal spine approximately equaling it. The first dorsal ray nearly equals the first spine, the others are progressively shorter. The first anal ray equals the third anal spine; the rest form a descending series. The depth of the caudal peduncle is 2.7 in the length of the head. The deeply forked caudal is a little shorter than the head. The pointed ventrals are 1.7 times in the head, their tips extending to the anus. The pectoral is 1.5 to 1.6 times in the head.

In alcohol the color is dusky along the dorsal region, becoming paler on the sides and passing into yellowish ventrally. The spinous dorsal is blackish and there is a submarginal black bar on the dorsal rays. The caudal is white with a broad black basal crescent and another black subcrescentic marginal band which fades into whitish on the extreme tip of the fin. The anal is more or less dusky on its basal half, with a white or colorless margin. The other fins are colorless or yellowish.

Here described from the type, 84 mm. long, and seventeen paratypes, 21 to 61 mm. long, obtained from a small river flowing into Suva Harbor, Viti Levu Island, Fiji Islands.

The caudal markings are unlike those of any described *Kuhlia*. *Bilunulata*, in allusion to the crescents on the caudal fin.

#### Family SERRANIDAE

##### ***Anthias mooreanus* sp. nov.**

*Type* from Moorea Island, Society Islands. No. 17325 Field Museum of Natural History. Length 63.5 mm. February 23, 1929.

Dorsal X, 16; anal III, 6; 54 scales in the lateral line, 6 between the first dorsal spine and the lateral line, 4 between the middle dorsal spines and the lateral line, and 15 between it and the origin of the anal.

The depth of the laterally compressed, somewhat ellipsoid body is nearly 3 times in the length, the dorsal and ventral profiles moder-

ately and almost equally convex. The small pointed head is 3.66 times in the length, the mouth oblique, with slightly projecting chin. The eye is 3.6 times in the head, longer than the snout, which is 4.4 times in the head. The broad interorbital is 3.4 times in the head; the maxillary extends to beneath the pupil, its expanded posterior two-thirds as wide as the eye. There is a pair of small outwardly curved canines at the symphysis and a pair of straight canines a little farther back in the upper jaw, all external and visible when the mouth is closed. There is a single row of coarse teeth in the upper jaw, and a row of fine teeth in the lower jaw, with a median hooked canine on each side. There is a patch of teeth on the vomer but apparently none on the palatines. The tongue is smooth. The posterior margin of the preopercle is serrated, the teeth enlarged at the angle, the interopercle not serrated marginally. The opercle bears two spines, the upper one much the larger. There are three or four small serrations on the lower part of the opercular margin and a few very small teeth on the subopercle. The entire trunk and head except the lips are covered with scales. The dorsals and anal have a low scaly sheath. The origin of the dorsal is a little behind the gill opening, the first spine less than half the second, increasing to the fourth, which is nearly 2.5 times in the head, the last six spines subequal. The soft dorsal is a little higher, 2.16 times in the head, pointed posteriorly. There is no notch between the dorsals. The third anal spine is longest, 2.88 times in the head, the third and fourth rays longest and equal to the soft dorsal. The depth of the caudal peduncle equals the soft dorsal. The lunate caudal is longer than the head, the tip of the lower lobe much elongated and thread-like and nearly 1.5 times the head. The pectoral equals the head. The pointed ventrals are a tenth shorter than the head and extend less than three-fourths of the distance to the anal.

The color in life was red, paler posteriorly, with two longitudinal bands, one extending back from behind the eye, the other from beneath the pectoral. In alcohol the color is olive brown above, paler to reddish brown below, the caudal pale yellowish, the soft dorsal dusky, the other fins all pale. A pale reddish stripe extends from behind the eye across the opercle, then downward and back along the middle of the side to the posterior third of the body. Another one starts under the lower angle of the pectoral and runs back to above the anal.

Here described from the type and only specimen, 63.5 mm. long, obtained on the reef at the island of Moorea, Society Islands.

This species is near *A. pleurotaenia*, but differs in shape, in the number of dorsal and anal rays, in the presence of two instead of three opercular spines, in the number of scales in the lateral line and in transverse series; the third dorsal spine is shorter and not longer than those behind it, and the color stripes are different.

*Mooreanus*, from the island of Moorea.

#### Family PEMPHERIDAE

##### *Pempheris dispar* sp. nov.

*Type* from Tenibuli, Ysabel Island, Solomon Islands. No. 17326 Field Museum of Natural History. Length 58 mm. April 18, 1929.

Dorsal V or VI, 7 or 8; anal III, 22 or 23; there are 59 or 60 scales in the lateral line plus 7 on the caudal base, 6 above and 15 or 16 below the line, and 29 or 30 predorsal scales.

The depth is 2.65 to 2.75, the head 2.75 to 2.8, the caudal 3.3 to 3.45, the pectoral 3.66 to 3.8, the length of the anal base 3.1 to 3.25 times in the length. The eye is 2.375 to 2.6, the snout 3.8 to 4.1, the interorbital 3.5 to 4, the least depth of the caudal peduncle 3.5 to 4 times in the head.

The mouth is oblique, with prominent chin, the maxillary extending beyond the middle of the eye. The lateral line is nearly straight. The edge of the preopercle is not serrate.

The color in alcohol is uniform yellowish brown except on the sides of the head and breast, which are darker brown. Before and beneath the ventrals is a blue black area. The tips of the caudal lobes are black, the fins otherwise yellowish to nearly colorless.

Described from the type, 58 mm. long, and seventeen paratypes, ranging down to 38 mm., collected at Tenibuli, Ysabel Island, Solomon Islands.

#### Family LETHRINIDAE

##### *Gnathodentex oculo-maculatus* sp. nov.

*Type* from Tenibuli, Ysabel Island, Solomon Islands. No. 17335 Field Museum of Natural History. Length 132 mm. April 17, 1929.

Dorsal X, 9; anal III, 8; there are 69 to 74 scales in the lateral line plus 5 or 6 more on the caudal base, 6 or 7 above the line and 15 to 17 below it; predorsal scales 12 to 14; 5 rows of scales on the preopercle.

The depth is 2.8 to 2.9, the head 2.9 to 3, the forked caudal 2.9 to 3.3, the pectoral 3.6 to 3.9 times in the length. The eye is



2.5 to 2.9, the snout 2.6 to 3.1, the interorbital 3 to 3.2, the least depth of the caudal peduncle 3 to 3.33 times in the head.

The body is elongate oblong, compressed, with pointed head, the upper profile more arched than the ventral outline, the very large and prominent eye impinging upon or even with the dorsal profile. The head is a little concave behind the eye, a little angulate at the interorbital, the snout convex, pointed, the mouth small, the maxillary 4 times in the head, not extending to beneath the eye. There is a pair of small anterior canines in the lower jaw. There is a coarsely toothed ridge on the upper maxillary. The preopercular margin is smooth. The dorsal spines are heteracanthous, the first 4.9 to 5.5 times, the fourth 2.85 to 3 times in the head. The third anal spine is 2.9 to 3.15 times in the head, the ventral 4.55 times to 4.45 times in the total length.

One specimen is reddish bronze with purplish reflections, very dark above the lateral line, paler below, with four dark reddish brown longitudinal stripes below the lateral line and six blackish oblique lines running up and back above the lateral line. Just below the lateral line is a pale glistening stripe, extending from the upper angle of the gill opening to beyond the pectoral tip. Most of the scales on the lower half of the body have a small white central spot, these spots forming longitudinal lines. The top of the head is deep dusky violet. On the top of the eye is a spot of the same color and below it is a short golden longitudinal bar. The dorsal and anal are colored like the body, the other fins nearly colorless.

Other specimens are brownish yellow with a very slight violaceous cast, with paler longitudinal lines along the center of each scale row and narrower darker lines between the scale rows. Just below the lateral line is a broader golden stripe extending from the upper angle of the gill opening back to about opposite the ninth dorsal spine. About four scale rows below this is another golden stripe (or rather indications of one) from the opercle to below the soft dorsal. There is a dusky spot on the upper side of the eye which evidently continued back to just above the origin of the lateral line but remains as a spot behind the eye, and another at the origin of the lateral line. On the upper part of the eyeball is a short longitudinal golden bar. The fins are all colored like the body.

Described from the type, 132 mm. long, and three paratypes, 101 to 120 mm. long, collected at Tenibuli, Ysabel Island, Solomon Islands.

This species is near *G. aureo-lineatus*, but comparison with specimens of the latter from several localities shows they are distinct in form, physiognomy, and color.

This handsome fish has the appearance of a *Holocentrus*, the head astonishingly so.

#### Family SCORPAENIDAE

##### **Sebastapistes badio-rufus** sp. nov.

*Type* from Takaroa Island, Tuamotu Islands. No. 17337 Field Museum of Natural History. Length 22 mm. February 12, 1929.

Dorsal XI-I, 8; anal III, 6; there are 22 tubulated scales in the lateral line, plus one on the caudal fin, 36 scales in a longitudinal row above the lateral line. There are 4 scales from the lateral line to the spinous dorsal origin and 9 to the anal origin.

The depth is 2.3, the head 2.1 times in the length. The eye is 3.3, the caudal 3.8, the interorbital 6 times in the head, and 1.8 times in the eye.

The body is compressed laterally, without flaps or dermal appendages. The mouth is large, extending beneath the posterior margin of the pupil. The preorbital has two spines, one directed forward, the other downward. There are no orbital spines, but two small ones behind the upper part of the eye. There are two pairs of nuchal spines. There are no nasal spines or tentacles. There are five spines on the posterior margin of the preopercle, three spines on the hind margin of the opercle and two small spines above it. The suborbital stay has a spine below the eye and terminates posteriorly in a spine.

In life the color was brownish red. In alcohol the color is pale reddish brown, the fins colorless.

Described from the type and only specimen, 22 mm. long, collected at Takaroa, Tuamotu Archipelago. This species is close to *S. bynoensis*, *S. tristis*, and *S. laotale*, but differs in having no cirri, tentacles, or dermal flaps, and no orbital spines.

#### Family POMACENTRIDAE

##### **Pomacentrus cranei** sp. nov.

*Type* from Tenibuli, Ysabel Island, Solomon Islands. No. 17338 Field Museum of Natural History. Length 68 mm. April 19, 1929.

Dorsal XIII, 14 or 15; anal II, 14 or 15; there are 25 scales in a longitudinal series, 15 tubulated scales in the lateral line plus 4

more with pores in the upper section, and 7 to 9 with pores in the lower section. There are 3 scales above and 9 below the lateral line. The snout is scaled to the nostrils, naked from there to the tip.

The form is deep, ovate, compressed, the dorsal and ventral profiles nearly alike; the depth is 1.9, the head 3.1 to 3.2 times in the length. The caudal and pectoral are only a little shorter than the head. The eye is 3.3 to 3.5, the snout 3, the least depth of the caudal peduncle 2 to 2.1 times in the head. The interorbital sometimes equals the eye, sometimes the snout. The mouth is small, the jaws equal, the maxillary not quite reaching a vertical from the front margin of the eye. The dorsal spines increase in length to the last, which is 1.5 to 1.66 times in the head. The dorsal and anal rays are much higher than the spines, the fin angulate posteriorly. The ventrals are elongate, with filiform tips extending to the second anal spines.

In life the color is brown with a blue spot on each scale of the opercle, a vertical blue line on each scale below the lateral line, and a blue spot on each scale of the anal sheath. Beyond the end of the lateral line is a large pale spot extending upon the lower part of the soft dorsal from the fourth to the seventh, or third to sixth rays. The caudal is yellow or pale, the other fins all black or dusky.

In alcohol the color is very dark brown, the blue lines and spots fading or disappearing, the pale spot on the base of the soft dorsal dusky yellowish or pale brown. There is a blue black circular spot on the opercle before the origin of the lateral line, and a small black spot at the upper angle of the pectoral base. The caudal is yellowish or very pale, the other fins black or dark brown.

Described from the type, 68 mm. long, and two paratypes, 62 and 64 mm. long, from Tenibuli, Ysabel Island, Solomon group, and two paratypes, 55 and 66 mm. long, from Hathorn Sound, New Georgia Island, Solomon group.

Named for Mr. Cornelius Crane, head of the Crane Pacific Expedition.

#### Family LABRIDAE

##### *Halichoeres fijiensis* sp. nov.

*Type* from Ovalau Island, Fiji Islands. No. 17341 Field Museum of Natural History. Length 51 mm. March 20, 1929.

Dorsal IX, 11 or 12; anal III, 10 or 11; scales in lateral line 27 or 28, in transverse series 3 above and 8 below the lateral line; predorsal scales 9 or 10.

The depth of the laterally compressed body is 3.25 to 3.3 times, the head 3.4 to 3.5 times in the length. The dorsal and ventral profiles of the head are alike, the lips even, the eye 3.3 to 3.5 times in the head, equal to the interorbital, and shorter than the pointed snout, which is 2.7 to 2.8 in the head. The dorsal is low, the rayed portion highest, about 1.5 times the eye, the anal a trifle lower. The bluntly rounded caudal is 5.25 to 5.45 times in the length, the depth of the caudal peduncle 2.3 times in the head. The pectoral is 5.1 times, the ventral 7 to 7.3 times in the length.

The color in alcohol is uniform bluish gray except on the under side of the head, which is yellowish white, each scale with a large pearly or white ocellated spot with a narrow dark brown margin, the spots forming longitudinal rows. The head is paler with a vertical blue or blue black bar behind the eye, and two horizontal bars or numerous short bars and spots running back from it. A blue bar extends from the eye to the tip of the snout and two or more broad blue or pearly bars cross the cheek irregularly, one usually extending diagonally from the angle of the mouth up to the eye and backward beneath it. There is a small blue black ocellus, white-margined, between the first and second dorsal spines, a very large blue black ocellus with wide white margin between the first and third dorsal rays, and a similar small ocellus on the caudal peduncle above the lateral line. The dorsal has from two to several rows of whitish dark-margined ocelli. The anal has two rows of similar ocelli which may fuse to form irregular bars or spots. The caudal is cross-banded by several rows of similar ocelli, which may fade entirely. The pectoral and ventral are colorless or whitish. In life all the ocelli are red.

This handsome species is close to *H. argus*, but differs in having large conspicuous blue black ocelli on the dorsal fin and caudal peduncle; furthermore, it lacks the dark band from the head to the caudal and the series of four or five light spots on the back characteristic of *H. argus*; from *H. binotopsis* or *H. leparensis*, which it resembles in some respects, the longitudinal rows of large ocelli on the trunk sufficiently distinguish it, while it lacks their dark cross-bars on the trunk. It has no dark bar at the pectoral base as in *H. binotopsis* and does not have the silvery white longitudinal lines of *H. leparensis*.

Here described from the type, 51 mm. long, and eleven paratypes, 28 to 57 mm. in length, obtained on the reef at Ovalau Island, Fiji Archipelago.

***Thalassoma cranei* sp. nov.**

*Type* from Tenibuli, Ysabel Island, Solomon Islands. No. 17347 Field Museum of Natural History. Length 89 mm. April 16, 1929.

Dorsal VIII, 13; anal III, 11; there are 26 scales in the lateral line, plus one more on the caudal base, 4 above and 9 below the line; the head is entirely naked.

The depth is 3.5, the head 3.3 to 3.5, the caudal 4, the pectoral 4.7 to 5 times in the length. The eye is 4.9, the snout 3.3 to 3.5, the interorbital 3.9 to 3.95, the least depth of the caudal peduncle 1.75 to 1.8 times in the head.

The body is oblong, compressed, the anterior dorsal profile regularly arched. The thoracic scales are smaller than those on the sides of the trunk. The scaly sheath on the dorsal is rather high, that on the anal lower.

The color in alcohol is brown, the dorsal region darker, paler below and whitish on the belly, with a darker vertical bar or streak at the base of each scale. The head is much darker than the body with dark purplish or violet bands on it as follows: a downward curved interocular band; another from the middle of the front margin of the eye to the tip of the snout and curving over to unite with a like band from the other eye; two bands from the posterior margin of the eye, curving upward and then down to the opercular margin before the pectoral; another band beginning beneath the eye and curving back to the opercular margin near the throat; above this band a purplish line from the preopercle to the hind margin of the opercle. On the base of the dorsal, extending from the second to the fourth rays, is a large blackish brown spot. On the base of the caudal peduncle is a very large blackish brown blotch. The dorsal is whitish or colorless with a median longitudinal band of brown and cross-bands of the body color extending up to the median band. The anal has a broad basal band of deep violet, the remainder of the fin white. The pectoral is yellow, fading to white, with a median longitudinal brown band and a blackish spot at the top of the pectoral base. The caudal is yellow, becoming colorless along the middle of the posterior part. The ventrals are yellow.

Here described from two specimens, a paratype 73 mm. and the type 89 mm. long, the smaller one from Auki, Malaita Island, and the other from Tenibuli, Ysabel Island, both of the Solomon group.

This handsome little labrid is near *T. lutescens* but is markedly different in the presence of the caudal and dorsal spots as well as presenting some differences in proportions.

Named for Mr. Cornelius Crane, who headed the Crane Pacific Expedition and made possible the ichthyological collections from the South Seas.

Family ELEOTRIDAE

*Alepideleotris* gen. nov.

Type, *Alepideleotris tigris* sp. nov.

Body entirely naked, without a trace of scales, laterally compressed, the head flattened; dorsal VII-1, 11; anal I, 10. Teeth pointed, in bands. Those of outer row in upper jaw strongly enlarged, curved, fixed, followed by four rows of much smaller depressible teeth. Lower jaw with an outer row of six strongly enlarged curved fixed teeth, like those in the outer row above, then three rows of smaller erect fixed teeth, and an inner row of large curved widely spaced depressible teeth. No teeth on vomer or palatines. The tongue is notched. The gill opening is confined to the base of the pectoral. The isthmus is broad. Branchiostegals 5.

The genus *Gymneleotris*, to which *Alepideleotris* seems closest, has scales on the posterior part of the body. *Heteroleotris*, often reported as naked, has ctenoid scales.

*Alepideleotris tigris* sp. nov.

Type from South Seymour Island, Galapagos Islands. No. 17348 Field Museum of Natural History. Length 39 mm. January 12, 1929.

Dorsal VII-I, 11; anal I, 10; depth 4.875, head 3.5 times in length. Eye 3.9 times, snout 5.5 times, maxillary 2.75 times in head.

The body is laterally compressed, the head depressed, the dorsal profile highest at origin of dorsal. The head is large, flat above, its breadth 1.7 times in its length. The eyes are rather large, latero-dorsal, very close together, their margins touching. The snout is blunt, with a median hump, the lower jaw projecting. The mouth is large, terminal, the maxillary extending to beneath the posterior part of the eye. Teeth are as given for the genus. Tongue is notched. The dorsals are well separated, the longest spine about 1.7 times in the depth. The second dorsal is nearly uniform, higher than the spinous portion, about 1.5 times in the depth. Anal is low except next to last ray, which equals length of soft dorsal rays. Length of pectorals is about 0.87 of the head, extending as far as the posterior end of the first dorsal. Origin of ventrals is a little in advance of the pectorals, much shorter, about 0.68 of the head, their pointed tips falling far short of the anus. Anal papilla is subglobose.

Color in alcohol brown, with six broad saddle marks of dark brown, contrasting alternately with bands of the ground color; dark brown spots along the side, each spot of two vertical bars; top of head with a broad dark brown transverse band; sides of head mottled with pale and dark brown. Spots and flecks of the paler ground color appear in the darker brown so that the whole body and head are brindled. The belly and throat are pale brownish. There is a dark brown bar at base of caudal and a dark brown spot on upper part of pectoral base. The fins are all brownish.

Here described from the type and only specimen, 39 mm. long, obtained from a tide pool at South Seymour Island, Galapagos Islands.

***Boroda malua* sp. nov.**

*Type* from Malu, Sepik River, New Guinea. No. 17349 Field Museum of Natural History. Length 333 mm. May 19, 1929.

Dorsal VI-I, 9; anal I, 8; there are 62 to 68 scales in a longitudinal, 19 to 22 in a transverse series, and about 52 before the dorsal.

The body is thick, wedge-shaped, robust, becoming exceedingly thick and bulky with age, little elevated, the breadth equaling the depth, 4 to 5 times, the head 2.55 to 2.7 times in the length. The head is broad, low, depressed, the cheeks becoming swollen with age, its breadth then 1.5 times in its length, the upper profile concave between the nape and the snout, with a big bony hump near the tip. The small eyes are lateral but high up, their upper rim on the dorsal profile, 8.25 to 11 times in the head, 2.2 to 3.6 times in the broad interorbital, and 2 to 3 times in the wide, bluntly rounded snout. The lower jaw projects very strongly so that its teeth are exposed when the mouth is closed. The teeth are in broad bands in both jaws, the outer row enlarged, about 9 rows in the upper jaw. There are 6 rows in the lower jaw anteriorly, the inner row enlarged also and becoming very large posteriorly, where the band decreases to only two rows. There are no palatal, vomerine, or lingual teeth. The anterior nostril is tubulated, very close to the upper lip. The posterior nostril is very large. The large mouth is strongly oblique, the maxillary extending to the posterior margin of the eye or beyond, 2.5 times in the head. There are large sensory pores by each nostril, on top of the head, on the supraopercular groove, and on the pre-opercular margin. The entire body except the tip of the snout, the lips, the underside of the lower jaws and the space between them, is covered with ctenoid scales, which become

cycloid before the dorsal and on the head. The caudal is covered for one-half or two-thirds its length with small to minute scales. The pectoral base is covered with small scales which become minute and extend almost to the pectoral tip.

The vertical fins are low, with no elongated spines or rays, and fall short of the caudal when depressed. The third, fourth, and fifth dorsal rays are equal in length or nearly so, 3.15 to 3.3 times in the head. The fifth to the eighth rays of the soft dorsal are longest, 2.25 to 2.65 times in the head. The anal is a little lower, its posterior rays 2.5 to nearly 2.9 times in the head. The broad pectoral is 2 to 2.5 times in the head. The least depth of the broad thick caudal peduncle is 2.5 to 3 times in the head. The broadly rounded caudal is about 1.5 times in the head. The ventrals are much shorter than the pectorals, reaching a little more than halfway to the anal origin, 2.2 to 2.4 times in the head.

In life the color was uniform dark brown or blackish, with faint longitudinal lines on the back and sides. The fins were dark brown or blackish on the rays, the membranes dusky violet or blackish. In alcohol the color is blackish or dark brown, becoming black on the top and sides of the head, the belly and throat paler to purplish or yellowish brown. Each scale has a darker center, these forming faint but distinct blackish longitudinal rows. The fins are all violaceous black or dusky, the dorsals clouded or marbled. The smallest specimen has the dorsal spines and rays spotted with yellowish, the membranes clear blackish violet.

Here described from the type, 333 mm. long (436 including the caudal and lower jaw), and six paratypes, from 203 to 280 mm. in length, taken at Malu, a village on the upper Sepik River, New Guinea, 230 miles from the sea. I also place here four young specimens, 31 to 42 mm. in length, obtained from a brook at Marienberg, New Guinea.

#### Family GOBIIDAE

##### *Macgregorella badia* sp. nov.

*Type* from Ovalau Island, Fiji Islands. No. 17373 Field Museum of Natural History. Length 41 mm. March 19, 1929.

Dorsal VI-1, 10; anal I, 7; scales in longitudinal series about 45, in transverse series 18 or 20; predorsal scales about 20, very small, obscure, and difficult to make out.

The depth of the low, elongate, laterally compressed body is 6 to 6.3 times in the length, the broad, depressed head 3.4 to 3.7



times. The breadth of the head is 1.3 to 1.4 times its own depth. The eyes are on top of the head, very close together, their inner margins almost touching, 3.3 to 3.4 times in the head. The lips are even, the mouth small, oblique, the angle of the maxillary not extending to a vertical from the front of the eye. The teeth are as given for the genus. The snout, sides, and top of the head are marked by numerous short transverse small black ridges, some behind the eyes being longitudinal, in the fashion characteristic of the genus. The body is covered with scales, much larger and ctenoid posteriorly, small to very small anteriorly and cycloid, the scales more or less irregularly arranged. The head, breast, and pectoral base are all naked. The first dorsal is low, its height 1.8 in the length of the head, reaching the second dorsal when depressed. The second dorsal is highest in its posterior portion, the longest ray about 1.5 times the first dorsal. The caudal peduncle is a little longer than deep, its depth 2.3 times in the head. The very long, pointed caudal is 2.25 to 2.4 times in the length, and half again as long as the head. The long, pointed pectoral is about 1.3 times the head and less than 3 times in the total length. The pointed ventrals are 4.1 to 4.2 times in the length.

The ground color in alcohol is whitish, punctulated with minute brown dots and cross-barred by four broad reddish brown bands, the first behind the pectorals, the last at the base of the caudal. In the larger specimen these are connected by a faint median longitudinal brown bar. There are five broad reddish brown bars across the back, the first behind the eyes, the second between the pectorals, the last at the rear part of the second dorsal. The fins are all cross-barred or mottled with alternate bands of brown or black and white, or with spots of black and white.

Here described from the type, 41 mm. long, and the paratype, 34 mm. long, collected on the reef at Ovalau Island, Fiji group. This distinct and handsome species is an unexpected addition to a genus heretofore known only from two species occurring in the Philippine Islands.

***Macgregorella santa* sp. nov.**

*Type* from Hog Harbor, Espiritu Santo Island, New Hebrides. No. 17374 Field Museum of Natural History. Length 48 mm. April 1, 1929.

Dorsal VI-I, 10 or VII-I, 9; anal I, 8; there are 45 scales in a longitudinal series, plus 3 more on the caudal base, and 14 to 16 in a transverse series; predorsal scales 14 to 18.

The depth is 6.25 to 6.5, the head 3.66 to 4, the pointed caudal 3.1 to 3.25, the pectoral 4 to 4.25 times in the length. The eye is 5.25 to 6, the snout 3, the interorbital 6, the least depth of the caudal peduncle about 2.2 times in the head.

The low elongate body has the posterior half laterally compressed, the head somewhat flattened above. The eyes are well separated, dorso-lateral. The blunt snout is broadly rounded. The wide mouth is oblique with prominent chin. The posterior angle of the maxillary is concealed by a broad fold of the lips, but does not extend much over halfway to a vertical from the front of the eye. The snout, sides, top, and underside of the head are marked by many short, black ridges and flaps of tissue, some of them simulating short barbels. The body is covered with cycloid scales, largest posteriorly, those on the breast and pectoral base minute, the head naked. The first dorsal is rather low, 1.55 to 1.65 times in the head, scarcely reaching the second dorsal when depressed. The second dorsal and anal are highest posteriorly, often reaching the caudal when depressed, 1.5 times in the head.

The color in alcohol is yellowish white overlaid with brown, darkest above, the ground color showing through as small pale spots on the sides. A blackish brown band extends from the snout back over the eye and usually along the side as far as below the middle of the soft dorsal or beyond, the anterior third much darker than the rest. Above the pectoral is a broad blackish brown cross-band connecting the longitudinal bands. A second cross-band lies opposite the middle of the second dorsal. A blackish brown stripe runs from the eye diagonally down and back across the cheek. The opercles are covered by a large brown spot and the rest of the head is more or less spotted with brown. The caudals are more or less dusky or brown spotted, and the anal varies from whitish to dusky. The pectoral base is heavily spotted with brown as is also the lower half of the fin, the outer portion paler to colorless. The ventrals are more or less lightly spotted with brown.

Twelve specimens, 15 to 50 mm. in length, were taken at Hog Harbor, Espiritu Santo Island, New Hebrides, one, 48 mm. long, being taken as the type. Ten specimens, 12 to 42 mm. long, were collected at Bushman Bay, Malekula Island, and one, 41 mm. long, at Malo Island, New Hebrides. A specimen, 18 mm. long, was taken at Tenibuli, Ysabel Island, Solomon Islands, and three specimens, 12 to 22 mm. long, at Hathorn Sound, New Georgia Island, in the same group.

Named from the island, Espiritu Santo, commonly called Santo.

**Gnatholepis corlettei** sp. nov.

*Type* from Bushman Bay, Malekula Island, New Hebrides. No. 17367 Field Museum of Natural History. Length 24 mm. April 4, 1929.

Dorsal VI-I, 11; anal I, 9; there are 26 scales in a longitudinal series, plus 2 on the caudal base, and 10 in a transverse series, and 11 predorsal scales.

The depth is 4, the head 3.4, the caudal 3.4, the pectoral 4 times in the length. The eye is 3.2, the snout 3.33, the least depth of the caudal peduncle 2.5 times in the head.

The compressed body is heavy anteriorly, the dorsal profile arched, and highest at the origin of the spinous dorsal. The snout is arched, the mouth small, the posterior extremity of the maxillary barely extending beneath the front margin of the eye. The teeth are minute, the jaws without canines. The ctenoid scales are loosely attached, those on the preopercle in three rows.

The color in alcohol is yellowish gray with three dusky bands on the lower half of the side, the first behind the pectoral, the last just at the pectoral tip when depressed. A fourth shorter bar lies beyond and two dusky spots between this and the caudal base which has a black spot on it. A broad blackish brown bar descends from the eye to the under side of the head and there is a dusky brown elongate spot lying above the pectoral base. On the upper half of the body there is a circular black spot on most of if not all the scales. On the sides of the head and lower half of the body are numerous pearly white or bluish white spots. The dorsal is vaguely spotted with brown. The anal has one or two rows of circular black spots. The pectoral base is white spotted, the fin colorless. The ventral is bluish white with a dusky margin.

Described from the type, 24 mm. long, and eleven paratypes, ranging down to 13 mm. in length, collected at Bushman Bay, Malekula Island, in the New Hebrides.

This little fish is close to *Gnatholepis davaoensis* Seale, but is sufficiently distinct.

I take pleasure in naming it for my esteemed friend, Mr. Ewan Corlette, of Bushman Bay, New Hebrides, whose interest in and knowledge of the botany, zoology, and anthropology of the New Hebrides is most extensive.

**Glossogobius koragensis** sp. nov.

*Type* from Koragu, Sepik River, New Guinea. No. 17365 Field Museum of Natural History. Length 142 mm. May 23, 1929.

Dorsal VI-I, 9; anal I, 8; there are 36 scales in a longitudinal series, plus 3 or 4 small scales on the caudal base, 11 in transverse series, and 30 predorsal scales.

The low, elongate body is compressed posteriorly, the head very long and depressed anteriorly. The depth is 5 to 5.9, the head 2.85 to 2.9, the long, round-pointed caudal 3.7 to 3.8, the pectoral 5 to 5.25 times in the length. The eye is 6.5 to 6.85, the snout 3 to 3.13, the interorbital 4.8 to 4.9, the least depth of the caudal peduncle 3.2 to 3.25 times in the head.

The large, oblique mouth extends beneath the front margin of the eye or a little beyond, the lower jaw projecting strongly. The head is entirely naked, or there may be a few small scales on the upper part of the opercle. The preopercle has five longitudinal lines of microscopic dots or papillae. The vertical fins are all low, the first dorsal not reaching the second when depressed and the second dorsal and anal falling far short of reaching the caudal base. The third spine of the first dorsal is longest, 2.8 times in the head. The third ray of the second dorsal is longest, 2.4 times in the head. The third anal ray is longest, 2.5 times in the head. The ventral extends a little more than halfway from its origin to the anal origin, 1.9 times in the head.

The color in alcohol is brown to yellowish brown, the dorsal surface a little darker to dusky. The caudal is transversely barred by dusky spots. The soft dorsal is similarly marked, the spinous dorsal more or less dusky. The pectoral is dusky to clear, the other fins yellow or colorless.

Described from the type, 142 mm. long, and a paratype, 112 mm. long, collected at Koragu, Sepik River, New Guinea. I also place here two specimens, 106 and 140 mm. long, from Ambot, Kerame River, New Guinea.

**Vaimosa balteata** sp. nov.

*Type* from Majalibit Inlet, Waigiu Island. No. 17386 Field Museum of Natural History. Length 19.5 mm. June 7, 1929.

Dorsal VI-I, 7; anal I, 6; there are 26 scales in a longitudinal, 9 in a transverse series, and 10 before the first dorsal.

The body is rather plump and heavy anteriorly, the depth 3.85 times, the head 3.16 times in the length. The eye is rather large

and prominent, extending above the head profile, 3 times in the head. The snout is short, steeply curved, 4.7 times in the head. The interorbital space is very narrow, the eyes nearly touching. The lower jaw is slightly included, the angle of the maxillary extending beneath the pupil. The spinous dorsal is moderate, the second spine elongate, with thread-like tip, nearly as long as the head. The second dorsal is 1.4 times in the head, the anal a very little lower. The ventrals extend to the anus, their length 0.9 of the head. The pectoral is almost equal to the head. The depth of the caudal peduncle is 2.25 times in the head. The caudal tip is broken, the fin about 1.3 times in the head. There are 17 scales on the opercle. Scales on the nape, pectoral base, and breast are much smaller than elsewhere on the body.

The color in alcohol is gray, clouded with brown spots and fine dots. A black band extends from the dorsal downward and slightly backward to the belly, but does not quite meet with its fellow. A black bar extends from the middle of the eye backward and downward to the lower end of the pectoral base. There are three or four oblong brown spots in a median series behind the black cross-band, and on the caudal base a darker spot with a clear center. The first dorsal is black, the other fins pale to dusky.

Here described from the type, a male 19.5 mm. long, collected in a creek flowing into Majalibit Inlet, Waigiu Island. A male paratype, 20 mm. in length, was also secured, but it is in very poor condition, the top of the head having been torn open.

**Vaimosa osgoodi** sp. nov.

*Type* from river flowing into Suva Harbor, Viti Levu Island, Fiji Islands. No. 17387 Field Museum of Natural History. Length 14 mm. March 13, 1929.

Dorsal VI-I, 7; anal I, 5; there are 26 scales in a lateral, 9 in a transverse series; predorsal scales 6.

The depth of the short, rather thickset body is 3.1 to 3.2 times in the length, the head 2.8 to 3 times. The breadth of the head is 0.9 of its depth. The back is convex, the ventral profile nearly horizontal. The eye is high up, dorso-lateral, projecting above the profile, 2.5 to 2.6 times in the head. The short, steep snout is only half an eye's diameter in length. The large, oblique mouth is terminal, the lips even. In males the gape extends beyond the eye, the posterior angle of the maxillary reaching nearly to the posterior angle of the preopercle. In the female the mouth is much smaller

and the posterior angle of the maxillary lies beneath the middle of the pupil. There are 7 scales on the opercle. The first spine of the first dorsal is longest, greatly elongated and thread-like in males, reaching to the posterior angle of the second dorsal when depressed and 2.15 times in the length. The next to the last ray of the second dorsal is longest, 3.1 times in the length. The first anal ray is longest, equal to the second dorsal. The depth of the caudal peduncle is 2.15 times in the head and very little less than its own length. The broadly rounded caudal is 2.5 times in the length. The middle and lower rays of the pectoral are much more elongated than the upper ones, equal to the head. The ventrals extend to the anal in the male, 4.2 times in the length, but are much shorter in the female, barely reaching the anus and not nearly reaching the anal fin.

The color in alcohol of the male specimen is brownish gray, with a row of four blackish spots along the middle of the side, two circular black spots on the caudal base, a black spot at the base of the first dorsal and two below the second dorsal, six black spots along the ventral side, a brownish black transverse bar from the spot below the first dorsal to the abdomen, a small black spot at the upper angle of the gill opening and two small dusky spots on the pectoral base. The scales are nearly all outlined by dusky lines and dots. Two broad dusky bands extend downward from the eye and one crosses the preopercle in a broad curve, its origin at the upper end of the opercle, its lower end behind the posterior end of the maxillary. The first dorsal has a large black spot on its basal posterior portion and another one above this. There are three transverse rows of black spots on the second dorsal and four on the caudal. The anal and ventrals are dusky, the pectoral colorless. The female is essentially like the male in coloration, but the first dorsal lacks the basal black spot and the second dorsal apparently lacks the rows of small spots but instead has a large basal black blotch. The fin is so badly mutilated that the markings are uncertain.

Here described from the type, a male 14 mm. in length, and the allotype, a female 16 mm. long. They were obtained from a small river flowing into Suva Harbor, Viti Levu Island, Fiji group. Thirty-three specimens in good condition were collected at Waigiu Island, their lengths from 10 to 16 mm.

Named for Dr. Wilfred H. Osgood, Curator of Zoology at Field Museum of Natural History, in recognition of his interest in the expedition.

***Callogobius ocellatus* sp. nov.**

*Type* from Ovalau Island, Fiji Islands. No. 17363 Field Museum of Natural History. Length 37 mm. March 17, 1929.

Dorsal VI-I, 10; anal I, 9; scales in longitudinal series from angle of operculum, about 63; in transverse series from origin of second dorsal, 20 or 22; about 24 predorsal scales.

The depth of the much compressed body is 3.9 times in its length. The head is large, its breadth equal to its depth, its length 3 times in the total. The eyes are very high up, latero-dorsal, prominent, very close together, their margins touching, equal to the short, blunt snout, four in the head. The dorsal profile is convex, highest at the origin of the dorsal, the broad blunt snout very steeply inclined. The mouth is nearly horizontal, the maxillary extending to beneath the posterior margin of the eye. Teeth in three rows in each jaw, a pair of small canines anteriorly in the upper jaw. The second dorsal spine is longest, 5.7 times in the total length or about 1.85 times in the head, reaching the origin of the second dorsal, which is higher, the longest rays 1.6 times in the head, the last ray much shorter than those preceding it. The anal is approximately equal to the second dorsal in height. The depth of the caudal peduncle equals its length, 2.7 in the head. The caudal and pectoral are equal, 1.2 in the head, the long, pointed ventrals 1.67 times in the head, extending to the origin of the anal.

The scales posterior to the pectoral are ctenoid, those on the last half of the trunk larger than those forward, which are cycloid and become very small before the dorsal and on the pectoral base and breast. The head is naked, a few scales above the opercles along median dorsal region. Cheeks and snout with rows of minute papillae.

The color in alcohol is brown, with four white cross-bands, the first at the origin of the first dorsal, the next at the origin of the second dorsal, the third at the posterior part of the second dorsal, and the last on the caudal peduncle; between these along the middle of the side lie four large dark brown white-margined ocelli. The lower part and under side of the head are alternately cross-banded with brown and white bands; the abdomen is brown, crossed by white lines; the pectoral base and fin are spotted and barred with brown and white, both dorsals barred with rows of brown spots, the anal dusky with two large white spots, the ventrals dusky with white spots, the caudal grayish.

Here described from the type and only specimen, 37 mm. long, collected at Ovalau Island, Fiji Archipelago.

**Ctenogobius aterrimus** sp. nov.

*Type* from Kulambangra Island, Solomon Islands. No. 17384 Field Museum of Natural History. Length 28 mm. April 23, 1929.

Dorsal VI-I, 8; anal I, 7; there are 28 scales in a longitudinal series and 12 in a transverse series.

The depth is 3.5, the head 3.2, the caudal 3.1, the pectoral 3.3 times in the length. The eye is 3.5, the snout 4.4, the least depth of the caudal peduncle 2.2 times in the head.

The anterior upper profile is convex, the snout very steep, the eye projecting above the profile, the mouth oblique with slightly projecting chin, the maxillary extending to a vertical from the front margin of the eye. The head is entirely naked, with a prominent pore behind the eye and a row of pores along the supraopercular groove. On the cheeks are two longitudinal and several vertical or crisscross lines of minute papillae. The eyes are very close together, their inner margins nearly touching. The second dorsal spine is longest, with filiform tip. The dorsal rays and anal rays do not reach the caudal when depressed, the posterior anal ray is longest.

The color in alcohol is black over the entire body and fins except the caudal, which is cross-barred by rows of paler spots.

A single specimen, 28 mm. long, was taken from a fresh-water stream on Kulambangra Island, in the Solomon group.

**Ctenogobius malekulae** sp. nov.

*Type* from Bushman Bay, Malekula Island, New Hebrides. No. 17385 Field Museum of Natural History. Length 23 mm. April 4, 1929.

Dorsal VI-I, 9; anal I, 8; there are 36 scales in a longitudinal series, plus one more on the caudal base and about 14 in a transverse series from the origin of the second dorsal to the anal origin.

The body is elongated, little elevated, the posterior part laterally compressed, the head flattened. The depth is 6.65 to 6.85 times, the head 3.4 to 3.5 times in the length. The breadth of the head is 1.5 times in its own length. The round-pointed caudal equals or is a little shorter than the head. The eyes are small and rather far apart, on top of the head, about 6.5 times in the length of the head. The flat interorbital is a fourth more than the eye, 5.2 to 5.4 times in the head. The wide, blunt snout is 3.6 to 3.75 times in the head, the least depth of the caudal peduncle 2.6 to 2.95 times. The pointed pectoral is 4.6, the slender pointed ventral 5 times in the length.



The body is covered with cycloid scales, largest posteriorly, the head and nape naked back to the first dorsal, as are also the breast and pectoral base. The scales are minutely crenulate posteriorly when seen under a compound microscope, but there is no trace of a ctenoid margin. The oblique mouth is large, the lower jaw projecting, the maxillary extending back beneath the eye. The teeth are in 4 rows, the outer row enlarged and widely spaced, the innermost row close set. The tongue is rounded at the tip. The posterior nostril is in a tube before the middle of the eye. Behind each eye is a large pore with a conspicuous raised margin and behind the interorbital space are two similar pores set close together. The margins of the suborbital, subopercle, preopercle, and opercle and under side of the head are more or less tuberculate-papillate.

The color in alcohol is pale yellowish with a broad brown stripe along the side, ending in a large, deep brown spot on the caudal base; the top of the head and cheeks is darkened by minute brown specks.

At Bushman Bay, Malekula Island, New Hebrides, the type and paratype of this peculiar goby were obtained, each being 23 mm. in length.

***Ctenogobius waigiensis* sp. nov.**

*Type* from Waigiu Island. No. 17413 Field Museum of Natural History. Length 39 mm. June 7, 1929.

Dorsal VI-I, 9; anal I, 8. There are 30 to 32 scales in a longitudinal, 11 in a transverse series, and 11 to 13 predorsal scales.

In the type specimen, 39 mm. long, the depth is 5.5, the head 3.5 times, the caudal 3.9 times in the length. The eye equals the snout, 3.66 times in the head. The narrow interorbital space is 3 times in the eye. The least depth of the caudal peduncle is 3.8 times in the head. The vertical fins are low, the first dorsal 2.3, the second dorsal 2.2, and the anal 3.66 times in the head. The pectoral is 1.25, the ventral 1.8 times in the naked head.

The body is plump anteriorly and laterally compressed posteriorly. The width of the broad head is three-fourths of its own length. The anterior profile is steeply descending, the lower jaw slightly projecting. The scales in advance of a vertical from the dorsal origin are much smaller than elsewhere. The teeth are arranged in 8 rows in each jaw, with an outer row of much larger and widely spaced teeth anteriorly, followed by a band of fine teeth and an inner row of slightly larger teeth. A posterior canine is present at the hind end of the outer row of teeth in the lower jaw. The tip of

the narrow tongue is rounded. There are two longitudinal, and at least four transverse rows of papillae on the cheeks and one vertical and three horizontal rows on the opercle.

The color in alcohol is uniform brown, with a small blackish spot above the opercle and a large dusky blotch on the basal portion of the pectoral. The dorsals are pale brown, barred by five rows of dark brown spots. The anal is dusky brown, the other fins are all grayish brown.

A paratype of the same length varies slightly in proportions. The head is 3.3 times in the length. The eye is 3.75 times in the head. The second and third dorsal spines are greatly elongated, reaching the middle of the second dorsal when depressed, a trifle more than 3 times in the length. The second dorsal is elongated posteriorly, extending on the caudal when depressed, 1.5 times in the head. The anal increases in height posteriorly, its longest ray twice in the head. The anal, caudal, pectoral, and ventrals are all dusky, the color otherwise as already given.

In smaller specimens there is often a series of seven or eight large pale spots along the lower part of the side and sometimes there are two pale bars on the cheeks. The dorsal and caudal are usually paler and conspicuously cross-banded with dark brown spots.

A total of 150 specimens, 9 to 39 mm. in length, was taken near the mouth of a small fresh-water stream flowing into Majalibit Inlet, Waigiou Island.

***Aparrius aurocingulus* sp. nov.**

*Type* from Ovalau Island, Fiji Islands. No. 17353 Field Museum of Natural History. Length 45 mm. March 20, 1929.

Dorsal VI-I, 11; anal I, 11; about 56 scales in a lateral, 18 or 20 in a transverse series.

The body is laterally compressed, the depth 5 to 5.5 times, the head 3.25 to 3.45 times in the length. The dorsal profile of the body is but little elevated, the short steep snout descending to the prominent chin. The eyes are high up, prominent, 3.5 to nearly 4 times in the head, close together, the interorbital space about one-fourth of an eye diameter. The angle of the moderately large, oblique mouth extends to a point beneath the pupil. The teeth are in 3 or 4 rows in each jaw, the outer and inner rows enlarged, with a lateral canine on each side of the mandible. The tongue is markedly notched. The head, nape, pectoral base, and breast are entirely naked. The

scales on the posterior half of the body are larger than those on the anterior half.

The first dorsal is high, the second spine sometimes elongate and filiform, 3.8 to 4 times in the length. The second dorsal equals or nearly equals the first dorsal, its posterior half highest. The anal is similar but from a tenth to a fourth lower, the posterior rays of both second dorsal and anal extending upon the caudal when depressed. The long, pointed pectoral slightly exceeds the length of the head. The pointed ventrals are 1.3 to 1.4 times in the head. The depth of the caudal peduncle is about 1.5 times in its own length. The caudal is about 2.5 times in the length, its central rays much elongate and readily broken.

The color in alcohol is whitish, palest below, with light brown blotches and spots over the upper part and a row of 5 larger spots down the middle of the side; on the lower half of the body are 9 white transverse lines, the first behind the pectoral base, the last two above the anterior part of the anal; on the sides of the head are 2 rows of dark brown spots and 3 diagonal rows of short golden bars or spots, extending downward and forward from the nape. The first and second dorsals are both yellowish gray with a longitudinal yellowish white bar with violet edges a little below the middle. One specimen has the entire bar very deep violet, almost black. The anal is whitish with a broad violaceous brown margin. The pectorals are colorless, with a yellow spot at the upper angle and a large yellow spot on the lower basal part. The caudal is yellowish with traces of dusky on the upper and lower margins. The ventrals are deep violet along their inner half. In life the perpendicular lines on the body and the lines and spots on the head were all golden, making this one of the handsomest of gobies. Unfortunately I was not able to take additional color notes from the still living specimens.

Described from four specimens, 36 to 45 mm. in length, obtained from a pool on a reef west of Ovalau Island, Fiji Archipelago.

**Amblygobius myersi** sp. nov.

*Type* from Hathorn Sound, New Georgia, Solomon Islands. No. 17352 Field Museum of Natural History. Length 57 mm. April 22, 1929.

Dorsal VI, 15; anal I, 13; there are 58–60 scales in a longitudinal, 20 in a transverse series from the origin of the second dorsal to the anal origin, and about 30 predorsal scales.

The form is elongate, with bluntly rounded head, the depth 5.4 times, the width 6 times, the head 3.8 times, the rounded caudal 3.56 times, in the length. The dorso-lateral eyes equal the broadly rounded snout, 3.7 times, the interorbital 4.4, the least depth of the caudal peduncle 1.8 times in the head. The pectoral equals the head.

The mouth is oblique, terminal, the jaws even, the maxillary extending beneath the front margin of the pupil. The teeth in the outer row of the upper jaw are few, widely spaced, large, curved, and fixed, those of the inner row small. The lower jaw has an outer row of large teeth terminating on each side in a very large canine, the inner row of stout curved teeth larger than those of the inner row above. The body is covered with ctenoid scales, those on the nape and breast much smaller than the rest; the predorsal scales extend to the eyes; there is a small patch of scales on the upper part of the opercle, the head is otherwise naked.

The dorsal spines are elongate with filiform tips, the fifth spine 1.35 times in the head; the second dorsal and anal are elevated, the last or next to the last ray longest, equal to the spinous dorsal and reaching the caudal when depressed. The ventral is short, not nearly reaching the anal, 1.55 times in the head.

The color in alcohol is whitish yellow, the snout violaceous gray. A white line runs from the dorsal origin to the inner margin of each eye. Another white line runs from the eye back to the top of the caudal peduncle, with 2 or 3 short bars across the nape near the eye. A dark-margined white band runs around the snout from the middle of the front margin of the eye, along the lower margin of the eye to the middle of the rear margin, then back to the upper part of the caudal base. A similar band on the chin connects the angles of the mouth, and runs back from the mouth to the pectoral base where it forms a loop, then continues underneath from the pectoral axil to the lower part of the caudal base. The fins are all whitish to nearly colorless, but the dorsals show traces of longitudinal pearly or violaceous bands. The longitudinal stripes on the head and body were evidently pearly or opalescent blue in life.

The type and only specimen of this beautiful little goby was collected at Hathorn Sound, New Georgia Island, New Hebrides. Its length is 57 mm.

Named for Dr. George S. Myers of the United States National Museum, an enthusiastic student of fishes who has been very helpful many times.

**Cryptocentrus geniornatus** sp. nov.

*Type* from Waigiu Island. No. 17364 Field Museum of Natural History. Length 41 mm. June 6, 1929.

Dorsal VI-I, 10; anal I, 11; about 80 scales in a longitudinal series and 8 more on the caudal base.

The depth of the slender, elongate body is 5.4 to 5.5 times, the long head 3.5 to 3.7 times in the length. The eyes are dorso-lateral, projecting above the profile, their inner margins nearly touching, 3.75 to 3.9 times in the head. The dorsal profile is convex, the steeply curved snout equal to the eye. The mouth is large, oblique, the maxillary extending beneath the pupil. The teeth are typical for the genus.

The dorsals are close together, the third and fourth dorsal spines much elongated and thread-like, equal to or longer than the head. The second dorsal and anal are high, 1.2 or 1.3 in the head, the posterior rays extending upon the caudal when depressed. The depth of the caudal peduncle is 2.6 to 3 times in the head. The long, pointed caudal is a little longer than the head, 3.1 times in the length. The pectoral is narrow, 1.2 in the head. The pointed ventrals reach to the anal and approximately equal the head. Posteriorly the scales are regularly disposed, but anteriorly they become very small and irregular and more or less imbedded. Under the microscope all except the anterior scales are seen to be ctenoid.

The color in alcohol is pale brown with seven broad dark brown cross-bands which slant forward as they pass from the back to the lower side of the body. The side of the head is clear olive brown, sprinkled with small, circular, pearly white spots, which extend upon the pectoral base. Behind the eyes and on the nape are spots and short bars of pearly white. On the membrane of the first dorsal and anterior half of the second dorsal are rows of large ocellated pearl white, violet-margined spots which form about 3 cross-bars. The anal is pale basally, becoming dusky marginally. The pale caudal has a blackish base and a blackish lower margin. The pectoral is pale, the ventrals plumbeous.

Here described from the type, 41 mm. long, and one paratype, 36 mm. long, collected at Waigiu Island.

**Atuona** gen. nov.

*Type*, *Atuona tricuspidata* sp. nov.

The teeth are in broad pavement-like bands in both jaws, all tricuspid. The outer row is enlarged and depressible in the upper

jaw. There are one or two pairs of canines in the lower jaw behind the band of teeth.

The body is smooth, naked, elongate, and laterally compressed, with rounded blunt head. The vertical fins are low, the dorsals separated, the caudal shorter than the head. The pectoral is nearly as long as the head, without free silky rays. The ventrals are united, slender, short. Dorsal VI-I, 11; anal I, 8; branchiostegals 5.

This genus is close to *Ibaya* Herre, but is unique among gobies in its dentition, which must be appalling to its prey. These fish are tiny inhabitants of tide pools, obtained only by using poison.

*Atuona*, the name of the village on the island of Hiva Oa, one of the Marquesas group, where the species was collected.

***Atuona tricuspidata* sp. nov.**

*Type* from Atuona, Hiva Oa Island, Marquesas Islands. No. 17356 Field Museum of Natural History. Length 21.5 mm. February 5, 1929.

Dorsal VI-1, 11; anal I, 8; the depth 5.5 times and the head 4.1 times in the length.

The smooth, naked, elongate body is laterally compressed, the back very slightly elevated, the head broader than the trunk, the snout very bluntly rounded. The circular eye is high up, lateral, approximately equal to the snout, 5 times in the head. The inter-orbital is equal to the eye. The mouth is oblique, low, the maxillary extending to beneath the eye, but varying in different individuals from below the front margin of the eye to beneath the middle of the pupil. Both jaws are paved with very broad solid bands of strong tricuspid teeth. The outer row in the upper jaw is enlarged and depressible, followed by eight rows of smaller teeth, narrowing to three or four posteriorly. The lower jaw has six rows of teeth which narrow down to two far back on the jaw. There are one or two pairs of strong hooked canines behind the last row of teeth in males. A pair of very small canines is present in females.

The dorsals are well separated, the tips of the spines sometimes slightly elongated and thread-like, the third spine about 1.7 times in the head. The posterior two-thirds of the second dorsal is higher than the first, the longer rays 1.5 to 1.6 times in the head. The broad pectoral is a little shorter than the head. The ventrals are short, about 1.67 times in the pectoral, their origin posterior to that of the pectoral, and extending less than halfway to the anus. The depth of the caudal peduncle is a little more than 1.5 times its length,

and 2.26 times in the head. The broad, rounded caudal is 1.3 times in the head.

In life the color is deep dull green with eight broad blackish brown cross-bands, sometimes meeting below, narrower than or equal to the interspaces, the first one above the pectoral base, the last one on the caudal base. The top and sides of the head are black, spotted with green. The first dorsal is black, with a row of pale green spots. The second dorsal and caudal are black with two or three transverse rows of pale green spots. The anal and ventrals are dusky or black, the pectorals colorless. In alcohol the green becomes white or nearly so; the sides and top of the head are handsomely spotted or dappled with white or pale marks; a white spot is before the dorsal; otherwise as in life.

Here described from the type and thirteen paratypes, varying from 12 to 21.5 mm. in length, collected at Atuona, Hiva Oa Island, Marquesas.

A handsome little fish with extraordinary dentition.

### **Papenua gen. nov.**

Type, *Papenua pugnans* (Grant).

This genus is distinguished from related genera, such as *Sicyopterus* and *Sicydium*, by the presence of bilobed teeth in the upper jaw and large canines in the front of the lower jaw.

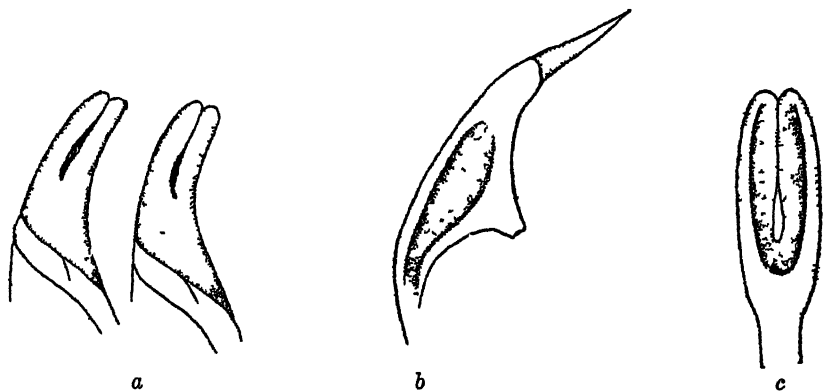


FIG. 33 Teeth of *Papenua pugnans* (Grant). *a*, seen from above, *b*, lateral view, *c*, front view. Greatly enlarged.

The upper lip is marginally crenate, its inner surface smooth, without papillae or tubercles. Both upper and lower lips are thick. The teeth of the upper jaw are minute, movable, bilobate. On the

lower lip is a row of tiny simple teeth. There is a pair of canines at the symphysis, with a row of smaller ones behind on each side.

The body is subcylindrical, the ventrals short, adnate, and broader than long. There are about 60 small ctenoid scales in a longitudinal series.

Type and only species known, *Papenua pugnans* (Grant), found in Samoa and the Society Islands.

*Papenua*, from Papenoo, the largest river in Tahiti, where this little fish occurs among the stones and gravel.

#### Family CALLIONYMIDAE

##### *Callionymus wilburi* sp. nov.

Type from Waigiu Island. No. 17491 Field Museum of Natural History. Length 20 mm. June 8, 1929.

Dorsal III-8; anal 7 or 8; caudal 10.

The depth is 6.9 to 7 times, the head 3 to 3.1 times in the length. The caudal equals the head. The width of the head is 1.25 to 1.3 times in its own length. The eye equals the pointed snout, 3 to 3.25 times in the head. The interorbital is a narrow ridge, much less than the pupil in breadth. The preopercular spine is 3.2 to 3.25 times in the head. The first dorsal is low, 2.33 times in the head, or the first dorsal spine may be much elongated, thread-like, and then longer than the head. The least depth of the caudal peduncle is 4.66 times in the head. The pectoral is 3.5 to 3.9 times, the ventral 3 to 3.33 times in the length.

The wedge-shaped trunk is much flattened, the long tail subcylindrical. The mouth is small, the maxillary falling far short of the eye. The preopercular spine has a sharp terminal tooth, two large hooked teeth on its inner margin, and an antrorse hook on its outer margin near its base. The small pointed snout is protractile and often much extended, but my measurements are made with it retracted.

The color in alcohol is whitish or gray, covered above with an intricate pattern of fine brown dots arranged in cross-bars and bands, the ground color showing in pearly areoles and spots which form a complicated and artistic pattern of rounded spots and festoons. The posterior rays of the first dorsal are black or blackish. The anal is colorless, or with a dark margin. The other fins are all more or less cross-barred with brown or blackish spots.

Four specimens, 16 to 22 mm. in length, were taken on a reef on the south coast of Waigiu Island, near Majalibit Inlet.



## Family GOBIESOCIDAE

**Gobiesox paradiseus** sp. nov.

*Type* from Eden Island, Galapagos group. No. 17404 Field Museum of Natural History. Length 41.5 mm. January 13, 1929.

Dorsal 7; anal 6.

The very large, depressed, anteriorly rounded head is broader than long, its length about 2.5 to 2.75, its breadth 2.4 to 2.6 times in the total length. The large latero-dorsal eyes are 3.25 to 3.4 times in the head, 1.25 times in the snout. The interorbital is narrower than the eye, 3.85 to 4.3 times in the head. The teeth in both jaws are in one row, the anterior ones in the upper jaw larger than the lateral ones. The incisors in the lower jaw are entire, comparatively broad, followed on each side by three narrower taller teeth, the last one much the highest, after which are six small teeth. The ventral disk is a little shorter than the head, 2.6 to nearly three times in length. The broad short pectoral is 2 to 2.25 times in the head, with a vertical fold of skin along the lower half of the base. The dorsal is inserted very far back, behind the vent, the distance from the origin of the dorsal to the end of the vertebral column 4 or a trifle more than 4 times in the total length. The caudal is truncate or with irregular margin, 3.75 to 4 times in the length.

The color is cherry red, more or less transversely barred with paler red or olivaceous on the posterior half. There is a large spot of very dark red between the eye and the pectoral and a similar spot midway between the eyes. These are red like the rest of the anterior part of the head. The pupils are conspicuously white. The dorsal is deep red. The anal is pale red or nearly colorless. The caudal is barred with pink and red. The under parts are yellowish. In alcohol, specimens become paler, and more or less olivaceous, especially on the posterior half.

Here described from three specimens, 28 to 41.5 mm. in length, the type and paratype from Eden Island and one paratype from South Seymour Island, Galapagos group.

*Paradiseus*, the Garden of Eden.

## Family BLENNIIDAE

**Enneapterygius punctulatus** sp. nov.

*Type* from Wala Island, New Hebrides. No. 17388 Field Museum of Natural History. Length 21 mm. March 29, 1929.

Dorsal III-X or XI-VII, anal I, XIV or XV. There are 32 scales in a longitudinal series plus two more on the caudal base. There are 13 to 15 tubulated scales in the upper section of the lateral line, 3 above and 6 below it. Beginning one scale beyond the upper section, there are 18 scales with pores along the middle of the side.

The depth is 5.25, the head 3.7, the pectoral 3.5 to 3.6, the caudal 4.2 times in the length. The eye is 2.85, the snout 2.85 to 3, the least depth of the caudal peduncle 3.5 times in the head.

The head resembles that of a *Trigla*, broad, with convex anterior profile and small pointed snout, the posterior half of the trunk compressed. The eyes are large, prominent, and very close together. The dorsal is in three divisions, the first very low, the height of the second about 1.9 times in the head, and that of the third about 2.8 times in the head, only the last ray divided. The anal is low, all the rays simple but the last. The pectoral is large, extending nearly to the posterior end of the second dorsal when depressed. The caudal is rounded.

The ground color of alcoholic specimens is whitish, largely concealed by black dots. There is a vertical line or bar of several black dots on each scale of the trunk, and similar dots are thickly strewn over the cheeks and the under side of the head, the breast, and the greater part of the pectoral. The top of the head and trunk back to the second dorsal is comparatively pale. On the trunk are 2 or 3 obscure white bands, extending upward upon the dorsal. The first dorsal is dotted with black specks. The second dorsal has a basal and a marginal black band, the interspace white or colorless. The third dorsal has a basal black band, the rays are black-dotted, the membranes clear. The anal is black, the caudal black with whitish tip. The upper third of the pectoral is whitish or yellowish, with black specks thinly sprinkled over it, the remainder black or dusky with many darker dots. The ventrals are black or dusky with pale tips. The iris is reddish bronze to reddish golden.

Here described from the type and five paratypes, 20 to 21 mm. long, collected at Wala Island. Three specimens, 19 to 21 mm. in length, were taken at Hog Harbor, Espiritu Santo Island, and one, 21 mm. long, at Malo Island, all in the New Hebrides.

This species is near to *Enneapterygius hemimelas* Kner and Steindachner, but differs too much in several characteristics, for example, in fin rays and proportions, to be placed with it.

**Enneapterygius waigiensis** sp. nov.

*Type* from Waigiu Island. No. 17494 Field Museum of Natural History. Length 17 mm. June 8, 1929.

Dorsal III-X or IX-VIII; anal I, XIII.

There are 28 scales in a longitudinal series plus 2 more on the tail, and 7 or 8 in a transverse series. The lateral line extends back only a short distance and consists of 8 tubes.

The depth is 4.5 to 4.85, the head 3.25 to 3.5, the caudal 3.9 to 5 times in the length. The maxillary equals the eye, which is 2.65 times in the head. The pointed snout is 3 to 3.2 times in the head. The interorbital is 2.5 times in the eye. The elongate pectoral is 3.2 times in the length. The ventral is 1.3 to 1.7 times, the caudal 1.16 to 1.6 times in the head. There is a small, simple tentacle on the upper margin of the eye.

The color in alcohol is whitish, with seven or eight conspicuous blackish brown spots beneath the anal, and a row of large brown spots along the middle of the side. Most of the scales are margined by a band of minute brown dots, with similar dots thickly sprinkled over the breast and sides of the head. The first and second dorsal are blackish, the remaining fins all cross-barred by rows of blackish brown spots.

Here described from the type, 17 mm. long, and a paratype, 19 mm. long, collected on a reef on the south coast of Waigiu Island, near the mouth of Majalibit Inlet.

**Tagusa** gen. nov.

*Type, Tagusa delicata* sp. nov.

Body slender, covered with medium-sized ctenoid scales, except on breast and belly before anal, the sides of the head and the pectoral base naked. The long dorsal is continuous, the posterior spines shortest, the vertical fins ending at the caudal peduncle and not attached to the slightly forked caudal. The incomplete lateral line is high up and prominent. There are no tentacles. The gill membranes are free from the isthmus. The jaws are subequal. The teeth are minute, uniform, simple, in bands. The length of the pectoral is a trifle less than the head, the lower rays simple. The ventrals are I, 2, shorter than the other fins. The caudal is slightly emarginate, scarcely equal to the head. The dorsal rays are 33 to 38. The anal rays are 23.

Separated from related genera by the continuous dorsal.

Tiny rock pool dwellers.

*Tagusa* from Tagus Cove, Albemarle Island, Galapagos, the type locality.

***Tagusa delicata* sp. nov.**

*Type* from Tagus Cove, Albemarle Island, Galapagos Islands. No. 17399 Field Museum of Natural History. Length 18.5 mm. January 9, 1929.

Dorsal XXII to XXIV, 11 to 14; anal II, 21.

The scales are 2-38-7, lateral line with 25 to 28 tubules. The head and body are laterally compressed; the head 3.5 to 4 times in the length; the depth 4.5 to 5 times in the length, much more than the breadth. The eye is 3 to 3.7 times in the head. The snout is convex, less than the eye, 4.3 to 4.4 times in the head. The interorbital is about equal to the snout. The mouth is small, terminal, the jaws equal or the chin slightly projecting, the maxillary extending beneath the anterior margin of the eye or to the pupil. The vertical fins are low, longest dorsal spines and rays and anal rays about equal. The pectoral varies from 0.85 of the head to almost equal its length. The caudal is equal to or less than the pectoral. The ventral is about two-thirds of the head.

Color in alcohol pale yellowish, with traces of about six saddle-like dark brown or blackish spots across the trunk or on the dorsal half only; fins colorless.

Here described from ten specimens 16.5 to 18.5 mm. in length, collected at Tagus Cove, Albemarle Island, Galapagos.

***Spinoblennius* gen. nov.**

*Type*, *Spinoblennius spiniger* sp. nov.

Tiny naked fishes near *Hypsoblennius*, but distinguished by having the top of the head covered with a bony plate, a prominent spine at the lower angle of the preopercle, and the absence of tentacles above eyes, nostrils, or on nape.

Dorsal XII, XI; anal II, 15 or 16; lateral line incomplete; no canine teeth; isthmus broad, the gill openings restricted to the sides; ventrals I-3; caudal slightly rounded.

***Spinoblennius spiniger* sp. nov.**

*Type* from Eden Island, Galapagos. No. 17395 Field Museum of Natural History. Length 15 mm. January 13, 1929.

Body robust anteriorly, the head about 3.5 times, the depth about 3.6 in the length, the eye about 2.4 times in the head, equal

to or slightly more than the interorbital width. The head large, blunt, nearly as broad as long, the short snout bluntly rounded and slightly protuberant, twice in the eye. The mouth small, inferior, the maxillary extending beneath the margin of the eye or back to the pupil. The teeth subequal with no trace of canines. The lateral line short, slightly curved, not extending to the end of the pectoral, with 5 to 8 tubules. The dorsal fin continuous, the anterior spines highest, the posterior ones low, the longest rays about equal to the highest spines. Dorsal and anal not extending on caudal peduncle. The caudal slightly rounded, 4.16 times in the length. The ventrals 1.33 in the head. The pectorals broad, slightly exceeding the head.

Color in alcohol pale yellowish, with six blackish bars over back and on upper half of sides; head dusky with many dark specks; under side of pectoral black, except upper third which is white; other fins colorless.

Here described from the type, 15 mm. long, and seven paratypes, from 14.5 to 15 mm. long, collected from a tide pool at Eden Island, Galapagos.

***Petroscirtes kulambangrae* sp. nov.**

*Type* from Kulambangra Island, Solomon Islands. No. 17392 Field Museum of Natural History. Length 36 mm. April 23, 1929.

Dorsal XXX; anal XVIII.

The depth is 4.35 to 4.5, the head 4.1 to 4.2, the caudal 4.5 to 4.7, the pectoral 6.55 to 6.6 times in the length. The eye is 3.2 to 3.4, the snout 3.3 to 3.45, the interorbital 4 to 4.3, the least depth of the caudal peduncle 2.15 to 2.3 times in the head.

The body is slender, elongate, compressed, with prominent eyes which are flush with the upper profile. The convex snout is nearly vertical. On the sides of the head are rows of prominent but small pores. The caudal is rounded.

In life the color is blue with three black lines, one at the dorsal base, one from the tip of the snout across the eye to the caudal, and the third from the pectoral base to the caudal. In alcohol there is a black band from the top of the head along the dorsal base and including the greater part of the dorsal anteriorly but narrower posteriorly and only covering the lower third of the dorsal, ending at the dorsal axil. Below this is a pale brownish band from the eye to the upper end of the caudal base, then a black band from the tip of the snout across the eye to the caudal, extending halfway across the fin. On this band are numerous vertical black bars as in *Petroscirtes tapeino-*

*soma*. Below this is a gleaming bluish white band from the mouth, curving upward across the head then back to the middle of the caudal. Below this is a third black band, extending from the base of the pectoral to the lower end of the caudal base and upon the anterior half of the caudal, with numerous vertical black bars upon it. The dorsal and anal are both margined by a brownish black line. The pectorals and caudal are clear.

Described from the type, 36 mm. long, and a paratype, 33 mm. long, collected from a fresh-water creek, Kulambangra Island, Solomon Islands.

Thirteen additional specimens, from 20 to 45 mm. long, were obtained from a reef in the harbor of Manokwari, in the northwest part of Dutch New Guinea.

In life this is a very handsome little fish, its deep blue coloration with vivid black lines making it very conspicuous.

***Salarias walensis* sp. nov.**

*Type* from Wala Island, New Hebrides. No. 17393 Field Museum of Natural History. Length 50 mm. March 29, 1929.

Dorsal XII-17; anal II-20.

The body is slender, elongate, not elevated, the dorsal and ventral profiles alike, the depth 4.85 to 4.95 times in the length. The head is 4.4 times in the length, nearly as deep as long, its anterior profile nearly vertical. The caudal equals the pectoral, 5.25 to 5.35 times in the length. The eye is 3.5 to 3.66 times, the snout (measured to the middle of the lip) 2.5 to 2.75, the least depth of the caudal peduncle 2.3 times in the head. The eyes are far forward, high up, and close together. The mouth is low down and wide, the maxillary extending beneath the posterior margin of the eye or beyond. There is a pair of short strong canines in the lower jaw. There is a simple tentacle on the upper part of the eye, equal to an eye diameter in length. There is no tentacle on the nostril or nape, and no occipital crest or fringe. The dorsal is not notched and does not extend to the caudal.

The color in alcohol is yellowish, sprinkled everywhere with minute brown specks; along the middle of the side is a row of 7 or 8 large circular blackish brown spots, with brown bands extending to the dorsal and anal; between some of these are smaller spots and narrower bands; along the back and extending upon the dorsal is a series of blackish brown spots; on the sides of the head and snout are scattered pearly or whitish circular spots with dark brown margins;

the opercle is blackish brown and the under side of the head and throat are brown; there is a longitudinal blackish brown band on the first half of the dorsal; on the second half the membranes are each marked by a dark brown vertical line; the anal is pale except for a dusky margin on its anterior third; the base of the caudal is clear with a large median blackish spot; the lower part of the caudal is dusky; the pectoral is pale.

Here described from three specimens, 35 to 50 mm. in length, taken at Wala Island, New Hebrides.







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